APRIL 2, 1951

STEEL

The Weekly Magazine of Metalworking

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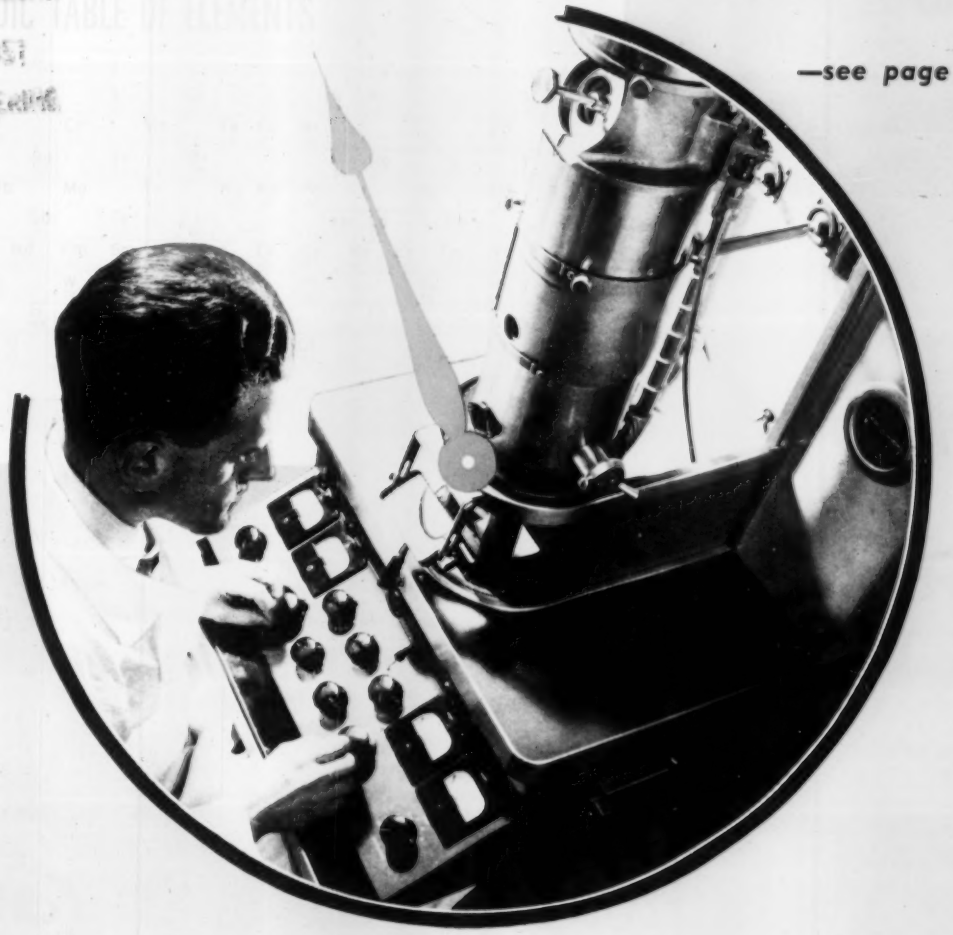
Shortages SPUR SEARCH FOR Substitutes

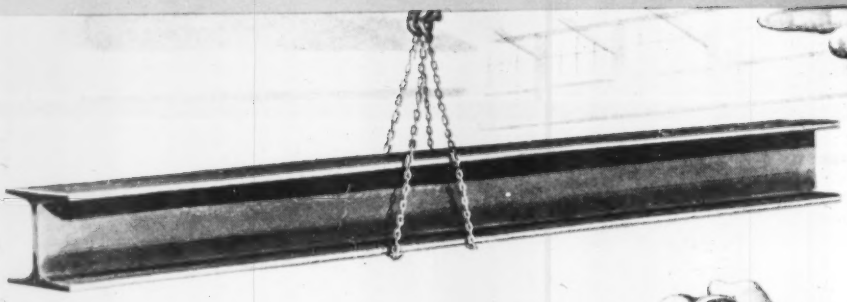
—see page 78



Controls Roundup, p. 59

What Platers Can Do About the Nickel Shortage, p. 81

24 hours a day—every day our Cranes are on the Job!



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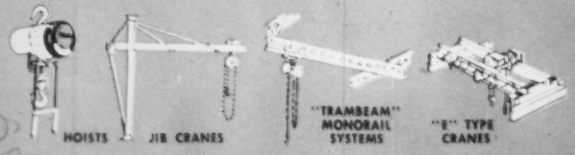

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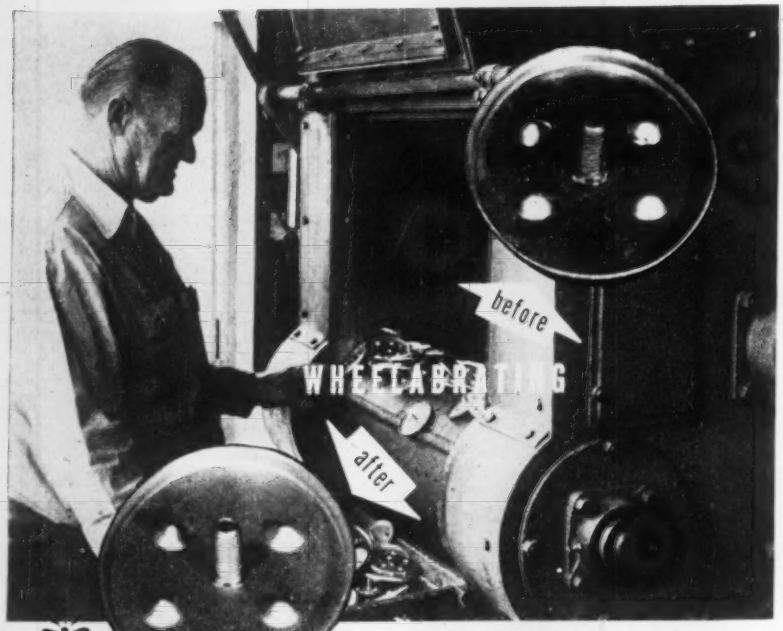

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LETTERS
TO THE EDITORS

New Uses for Titanium

I was much interested in your excellent article on the selection of sintered carbide cutting tools, STEEL, Mar. 12, p. 80. I congratulate you on the number of important points you bring out . . .

Referring to p. 79 and your article on titanium carbide ring thread gages; to the best of our knowledge, a straight titanium carbide with binder only is seldom used. Usually, the titanium carbide is the smaller portion of the alloy, the rest being tungsten carbide or molybdenum carbide. What is the titanium alloy in question?

L. Gerald Firth, vice president
Research & Development
Firth Sterling Steel & Carbide Corp.
McKeesport, Pa.

• *Name of firm developing gages forwarded; complete analysis has not been divulged.*

More Data on Diffusion

I note with interest your item titled "Diffusion Alloying"—STEEL, Mar. 5, p. 79. Where can I secure additional information?

Horace Drever, president
Drever Co.
Philadelphia

• *Contact* The Engineers Digest, *120 Wigmore St., London W 1, England; or the publication's New York address: 366 Madison Ave.*

Who Gets "Who's Who"?

Your summary, "Who's Who in the Defense Organization," STEEL, Feb. 26, pp. 54-55, will be a useful tool in our business. Send us 25 copies as soon as possible.

R. R. Lovell, director of priorities
Walker Mfg. Co.
Racine, Wis.

Send six copies of "Who's Who in the Defense Organization."

F. H. Robertson, department of manufacture
United States Chamber of Commerce
Washington

• *Copies forwarded.*

Appliances: How Much Steel?

What percentage of American primary iron and steel production is used in manufacture of electrical appliances in the U. S. What is the percentage used by the overall U. S. electrical manufacturing industry?

R. C. McNeil, commercial assistant
Canadian Electrical Mfrs. Association
Toronto 5, Canada

• *Total consumption of finished steel by U. S. electrical manufacturers in 1950 was 5½ per cent: Consumer appliances took 3 per cent; other manufacturers received 2½ per cent.*

STEEL
The Weekly Magazine of Metalworking

VOL. 128 NO. 14 APRIL 2, 1951

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Editorial and Business Staff—Page 10. Advertising Index—Page 174. Editorial index available semiannually. STEEL also is indexed by Engineering Index Inc., 29 West 39th St., New York 18.

Next Week **. Neutralizing Industrial Waste Liquids . . . Ring Gear Grooves Ground Automatically . . . Meehanite Castings Find Wide Use in Steel Plants . . . Proposed Charging System Could Boost Open-Hearth Production**

Published every Monday by the Penton Publishing Company, Penton Building, Cleveland 13, Ohio. Subscription in the United States and possessions, Canada, Mexico, Cuba, Central and South America, one year $10; two years $15; all other countries, one year $18. Single copies (current issues) 35 cents. Metalworking Yearbook issue $2.00. Entered as second class matter at the postoffice in Cleveland, under the Act of March 3, 1879. Copyright 1951 by Penton Publishing Co.

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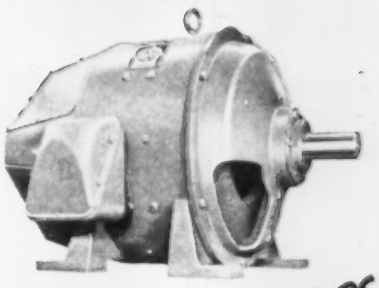

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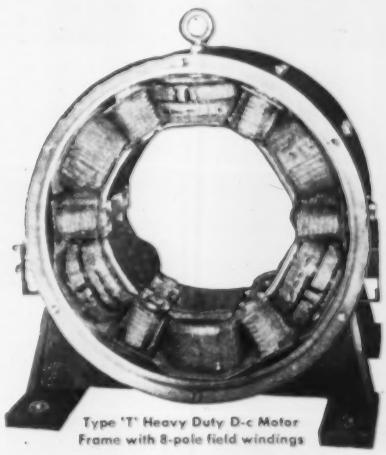

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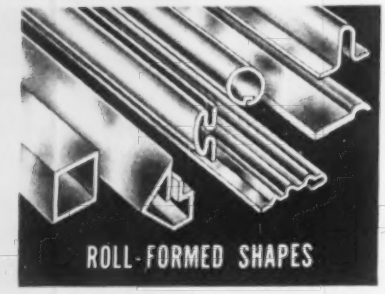

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Behind the Scenes...

The Quiet Life

We note two trends that we heartily approve of in American commerce and industry.

Hush-A-Phone Corp., New York, informs us that it's celebrating its 30th year of making a device that silences the voice when you're talking over the telephone or into a dictating machine. Until we received the Hush-A-Phone announcement, we never realized there was such a remedy for a problem that's been bothering us for years.

We made a check a while back and discovered that we make and receive an average of 17 phone calls a day and spend an average of three minutes on each call. Although we spend a little less than half of the time on each call talking, we still must make a lot of distracting noise in the 20 or so minutes we are using our voice over the phone each day.

We imagine that the editors upstairs must be on the phone far longer than we because they do a good deal of their news-gathering and checking over the local and long distance wires. It's not uncommon to go down the editorial corridor and see seven or eight of the boys all using Mr. Bell's invention at once.

Another trend we think should be encouraged has Ajax Electric Co., Philadelphia, as one of its principal backers. Every afternoon at about 3:30 Ajax serves tea throughout its offices, drafting rooms and laboratories. Visitors seeing the event for the first time often raise eyebrows, but Ajax knows what it's doing.

Ajax finds that 3:30 is a low-ebb hour, and a spot of tea is welcome. Serving tea at the desks and drawing boards is a time-saver, too, for it helps do away with the time-consuming practice followed almost everywhere in industry as employees straggle out throughout the afternoon for coke or coffee.

Easter Outfit

You have probably already noticed the new spring outfits in which The Metalworking Outlook, Production and Engineering News at a Glance, and The Market Outlook are garbed. Those three departments—on pp. 41, 77 and 143 in this issue—lead off the news, engineering and market sections each week. The type has been revamped to a Spartan face for easier, quicker reading. Associate Editor John Morgan writes The Metalworking Outlook, Associate Editor Art Allen the engineering column and Market Editor Bill Rooney, The Market Outlook.

On Photography

Photographs are tricky things that the editors and advertisers spend hours poring over. In the business magazine media, both editors and advertisers have the same problem in choosing good pictures: Get illustrations that show things in action. That's far easier to do with people than with inanimate objects like machines.

There are three good examples among many in this issue on how advertisers have successfully solved the problem. You can see instances of first rate industrial photography in the ads of R. K. LeBlond Machine Tool Co. on pages 14 and 15, Sun Oil Co. on page 70 and Micromatic Hone Corp. on page 103.

You can also see some good examples scattered throughout the editorial sections this week. In charge of editorial photographs in STEEL is Associate Editor Ed Birkner. He sees hundreds a week from photo agencies and metalworking companies. When those sources can't supply what we need, our own photographer, Dan Reebel, or one of several freelance men are commissioned to get what we require.

Puzzle Corner

In the Mar. 19 puzzle, the man was 48, the wife 36, the boy 20 and the girl 16. First in with those correct answers were C. E. Blass of Talon Inc., Robert J. Bagby of Bagby & Co., T. S. Bean of Barber & Ross Co., E. R. Sewall and R. L. Wahlstedt of E. B. Sewall Mfg. Co. and E. J. Sampson of Brockton, Mass.

A small plot has the shape of an equilateral triangle. The area of the field is the same number of square feet as there are yards in the perimeter. What is the length of a side and what is the area of the field?

Shrdlu

(Metalworking Outlook—page 41)

The Metalworking Outlook

$55 Billion a Year for Defense

The U.S. will spend $55 billion a year on defense for the next three years—provided world affairs get no worse than they are now. That's a lot of money, but less than 20 per cent of the $300 billion gross national product expected annually through 1953. GNP is the economists' term for the dollars you and everyone else in the U.S. get for goods and services. The Defense Department wants the capacity to produce military goods higher than the 20 per cent ratio, but a lot of that potential will be on a standby basis. The 80-20 ratio is just a rough proportion. Some industries—aircraft particularly—will allot nearly all their production to defense; others will contribute far less than a fifth of their output to the military (p. 49).

More Help for Subcontractors

The Air Force is using a contact-team plan to help prime contractors line up suppliers. Primes organize a team and the Air Force furnishes office space and handles publicity so that the team may interview prospective subcontractors. Wright Aeronautical Co. landed at least 60 suppliers that way for its engine program. The scheme supplements subcontracting clinics and other Air Force plans designed to speed defense production.

Small Business: Big Operator

Expect an increasing proportion of defense business to go to companies employing less than 500. Firms in that classification got 21 per cent of the dollar value of all defense contracts in the last half of 1950—$576 million worth in the third quarter and $858 million worth in the fourth. Washington is considering permitting small companies to pool together to win even a greater percentage of the military business (p. 56).

Battle for Foreign Aid

Growing more heated is a wrangle between the State and Defense Departments over the Mutual Defense Assistance Program for Atlantic Pact nations. State claims Defense is grabbing most military equipment in sight for American needs, leaving little for MDAP. Defense counters by saying we have the Korean war to win; what's more, MDAP in 1950 sent this to friendly nations: 1600 tanks and combat vehicles, 750 major pieces of artillery, 6000 general purpose vehicles, 600 aircraft, 50 naval and small craft and many other items that totaled 725,000 tons of material.

Fewer Engineers

Get set for a shortage of engineering personnel. During the past two years, industry has quickly grabbed the 50,000 college engineering graduates entering the labor market each year. In 1951 we're going to have only 32,500 new graduates added to the technical reservoir, when more than 50,000 will be needed because of industry expansions and the draft. The situation ahead is even more serious:

Production-Engineering News—p. 77 *The Market Outlook—p. 143*

An estimated 25,000 engineering graduates in 1952; 20,000 in 1953; only 17,000 by 1954.

PAs Warn of Inventory Recession

Stage may be set for another period of inventory recession, similar to that of 1949. So says the National Association of Purchasing Agents. Industrial buyers find finished goods pipelines are filling, scare buying is dropping, consumers are resisting prices.

More Pig Iron, Less Scrap

Steel producers are alarmed at the growing scrap shortage. E. T. Weir, chairman of National Steel Corp., says the American steel industry must prepare now to use a "much higher" proportion of pig iron in production of steel. It's no accident that the steel expansion program thus far announced includes construction of 13 new blast furnaces and the enlargement of three more. When completed, probably not until the end of 1952, the units will increase the nation's pig iron capacity by an estimated 6.5 million tons.

Buick Changes Its Mind

The high-compression V-8 engine of the overhead-valve type, originally thought to be due for appearance on 1952 Buick models, now is scheduled for the 1953s, when the major change from a straight eight to a V-8 can be tied to Buick's fiftieth anniversary celebration. The plant in which the engine is to be built, never officially acknowledged as such, has had its finishing touches. Production equipment will have to be installed and operating within the next 12 months.

New Nickel Refinery?

Falconbridge Nickel Mines Ltd., which has mines in the Sudbury, Canada, district near International Nickel Co.'s, may build a nickel refinery on the American shore of Lake Erie near Cleveland or Toledo. The project is still a couple of years off. Falconbridge now ships matte all the way to its refinery in Norway and then brings the nickel back to this continent.

Straws in the Wind

Expect all car makers to eliminate the spare tire on their new models; the move will mean a run on replacement tire stocks . . . The name of Paul Hoffman—former Studebaker president and ECA administrator and now head of the Ford Foundation—is being heard increasingly as a possible presidential nominee in 1952.

What Industry Is Doing

U.S. industry will spend a record $23.9 billion in 1951 on new plant and equipment (p. 50). . . . Henry J. Kaiser predicts we'll need an ingot capacity of 130 million tons by 1955 (p. 50) . . . The first model of the T-41 tank has rolled from Cadillac's Cleveland plant three months ahead of schedule (p. 51) . . . Antifriction bearing makers have to extend deliveries, but they still do well on shipments despite materials shortages (p. 53) . . . Automakers, particularly General Motors, are leading the pack on defense contracts (p. 54) . . . The Schuman plan to pool West European coal and steel resources may be in operation before the end of 1951 (p. 55).

Why Morality Is Low

As a result of revelations of the Fulbright and Kefauver investigations, the American people are aware of an alarming deterioration in public morals and in integrity of government. There is a widespread disposition to blame much of this upon President Truman. It is said that his obstinate loyalty to unworthy cronies blinds him to their weaknesses and that this trait in the person of the President, who is expected to set an example of high moral standards, encourages his subordinates to indulge in questionable tactics.

No one can deny the validity of this line of reasoning. By repeatedly upholding inept or dishonest associates, Mr. Truman has invited this sort of criticism. But to blame him alone for the present sorry state of affairs is to overlook other important factors. If he were to fire every shady character tomorrow, the act would bring refreshing pure air to the White House, but would it raise the moral standards of the nation by a substantial percentage?

No. Because much of the callousness to unethical practices results from a conditioning process extending over nearly two decades under which every citizen has been begged to shift many of his problems from his shoulders to those of Uncle Sam.

When the federal government says to jobless workers, "We'll see that you get part pay while you're idle," it helps many worthy persons but it also creates a temptation for chiselers. When it says to industry, "Let Uncle Sam give you an RFC loan," it helps some hard-pressed companies but it also tempts opportunists. When it invites farmers and others to take subsidies, it helps some deserving individuals but it also attracts a horde of undeserving sly operators.

Too big a government and too easy feeding at the trough of public money are important factors in the decadence of morals. The remedy is a re-evaluation of the warranted obligations of the federal government to the people. Restore to individuals the responsibilities that are naturally theirs and you will gradually break the habit of looking for "easy" public money which breeds low moral standards.

E. C. Shaner

EDITOR-IN-CHIEF

GUNS AND BUTTER TOO: We're an emotional and moody nation. When a new challenge appears over the horizon we emphasize the difficulties it will entail and the weaknesses which will hinder us in meeting it. Then we knuckle down to the job and presto—before we know it—we are well on our way toward licking it.

Government figures indicate that we are going to spend $23.9 billion for new plant and

equipment in 1951. This is a new high and it compares with $8.2 billion spent in 1941 when we were building up military strength for World War II.

As a result of this marked expansion in facilities Washington authorities now are predicting that we can do a whale of a job in mobilizing for defense and yet have available a greater capacity for peacetime production than previously had been thought possible. —p. 50

POOLING FOR ORDERS: Out of the desperate efforts of numerous small metalworking companies to obtain defense work has developed a pooling arrangement under which a number of companies unite to obtain and execute defense contracts or subcontracts.

Three types of pools are being considered. In one, a well-qualified member of the pool is chosen by other members to act as general manager and chief executive officer. In a second, where subcontracting is sought, the contractor may be asked to manage the pool. This is known as the "mother hen" type of management. In the third, the members set up a jointly-owned, nonprofit corporation to operate the pool. The several pools that already have been organized have adopted this third plan.

The pool idea has not been tested thoroughly. There are certain legal hurdles to be cleared. Nevertheless, some companies may find it worthwhile to investigate its possibilities. —p. 56

AHEAD OF SCHEDULE: Last Tuesday top Army brass flew to Cleveland to accept delivery of the first 26-ton T-41 light tank to roll off the assembly line of the Cleveland airport plant of Cadillac Division of General Motors. Significant is the fact that delivery was made three months and four days ahead of the target date.

Just what this achievement means is best known to the crew of Cadillac executives who took over the tank assignment last August. They came to a gigantic plant which in World War II was operated by the Fisher Body division of GM in the production of bombers. They found the place jammed with beans stored for the Commodity Credit Corp. These removed, they installed machines. Their ingenuity in expediting delivery of equipment and material is a fascinating story. If their resourcefulness and initiative is characteristic of the defense program, we are really on our way to progress. —p. 51

PROCESS DE-ENAMELS: A problem that plagues many manufacturers of products which include enameled parts is that there is no market for defective enameled ware. This means that the manufacturer not only must write off spoiled work as a complete loss but also that the metal in the defective parts is not available for reuse as scrap.

Relief from this situation may result from the successful operation of a pilot plant in Chicago in which a new process removes about 90 per cent of the enamel in 2 hours. After this operation, the parts are exposed to a silica sand blast which removes sludge and most of the remaining enamel. The resultant surface is in excellent condition for re-enameling. A stove manufacturer tried this process on 6200 defective enameled stove tops with the result that 6020 or 97 per cent were salvaged for re-enameling. Pilot plant activities are about to be transferred to a new plant for commercial operation. —p. 91

INDUSTRY'S NEW BRAIN: A conference held in Detroit last week under the sponsorship of Wayne University's computation laboratory, the Industrial Mathematics Society and the Association for Computing Machinery emphasized the probability that electronic computers or the so-called "mechanical brains" will find important applications in industry.

While many of the papers presented at the conference were too technical to be understood by average industrial executives, it was clearly evident that the experts already have made striking progress in applying their computing techniques to manufacturers' problems. For instance, the differential analyzer at Wayne University has indicated to a washing machine manufacturer how a cylindrical basket should be balanced so that vibration would be virtually eliminated. Another job was to indicate the combination of springs, shock absorbers, tire inflation and mass on an automobile which will provide the smoothest ride.

Apparently we are destined to hear much about electronic computation in the future. —p. 112

Washington Shifts Sights

The Russian bear becomes the subsidiary target and the inflation bull the major as world conditions change

MOBILIZATION planning has taken a new tangent in Washington—one which may make more materials available for civilian production.

Defense Boss C. E. Wilson and his staff are shifting emphasis from the Russian bear to the inflation bull. Russia can and may still start a war, government planners reason, but the chances for peace now are much better than three, six or nine months ago. That doesn't mean we will abandon mobilization. Far from it. Defense spending will soon hit a $5 billion-a-month plateau which probably will be maintained until 1953 at least.

Here are the principal reasons why Washington will aim more at inflation:

Russia hasn't started World War III yet, despite several chances. War is still possible, but if it comes now, it will flare from some accidental incident, reason administration planners.

American industry is well started toward mobilization. Business expansion is proceeding at a phenomenal rate (see p. 50).

The idea never was to produce defense goods at World War II levels if Russia backed down. A rule-of-thumb ratio is 20 per cent defense and 80 per cent civilian output. That varies, of course. In some cases—cobalt is an example—nearly all production will go to defense. The disproportionate amounts of some materials going to war accounts for many materials troubles we're having.

Tremendous pressure is being exerted on the defense organization to keep materials flowing into civilian production. The Senate Select Committee on Small Business wants aluminum orders eased. Other Congressional groups, labor, agriculture and business units all want consideration.

Inflation hasn't stopped. The wholesale price index rose to 183.9 on Mar. 20, 2.2 per cent above Jan. 23, 1951, and 20.7 per cent above a year ago.

Here's what the shift in mobilization tactics will mean to you:

More help in getting materials. You'll be better able to get assistance from NPA in obtaining raw materials, even when your product is civilian, if you can show shortages will bring unemployment or hardships to the community. Administration thinking is this: Keep the nation's economic activity as normal as possible. An economy that devotes 80 per cent of its energy to civilian output will produce a lot of consumers' goods—nearly as much as in many postwar years and more than before the war. That will encourage price stability.

Moderate distribution controls wherever possible. If we do get a Controlled Materials Plan, it will probably be the open-end type. That is, the supply of steel, aluminum and copper remaining after all defense and defense-support requirements had been scheduled would be free.

Broader price controls. The Administration wants to extend price curbs to farm products, or at least to more processed farm products. For the time being, it will not tighten existing restrictions on manufactured products, but it may do so later if conditions warrant the move.

Effects of the shift policy will be gradual, but a few are already apparent. NPA is more sympathetic to requests for help from civilian product makers. NPA's Iron & Steel Division has relieved steel mills from the necessity in April and May programming of honoring DO-97s for maintenance, repair and operation asked by companies already covered by NPA-directed programs. Excessive quantities of steel products covred by DO-97 for scheduling during June should be referred to the division if quantities involved would result in serious dislocation to normal distribution and production schedules, NPA advises. Another remedial action may come in revisions to M-1 expected to be issued next week. Lead time will be lengthened for DO-rated orders, particularly for alloy and stainless steels. The modified government policy will not be soon apparent for unusually scarce materials, such as aluminum.

More Defense Aluminum

MORE ALUMINUM for defense, less for civilian use!

That's the word from the National Production Authority.

Effective Apr. 1, the amount of aluminum producers and fabricators must set aside for filling defense-rated orders is increased one-third

and the amount distributors and jobbers must set aside is nearly doubled. The change is made through amendment to NPA's order M-5.

A producer of primary aluminum must accept rated orders for shipment per month of a total tonnage of aluminum products, including pig and ingot, that would equal up to 60 per cent of his scheduled production in terms of total primary pig tonnage for that month. Heretofore, the figure was 45 per cent.

The Percentage — A producer of secondary aluminum must accept rated orders for shipments per month of a total tonnage of aluminum products, including ingots, that would equal up to 60 per cent of his scheduled production in terms of total ingot tonnage for that month. The figure had been 45 per cent.

A distributor or jobber must accept rated orders for shipment per month of a total tonnage of aluminum products that would equal up to 45 per cent of such products available to him during that month. Previously the figure was 25 per cent.

Specific percentages of various products that aluminum producers and fabricators must set aside per month for filling defense-rated orders are the following amounts of average monthly shipments during the first eight months of 1950: Sheet (coiled and flat), plate, circles and blanks, 55; extrusions and tubing, 60; rolled shapes, 45; rod, bar, wire and cable, 50; forgings and pressings, 75; castings, 55; secondary ingots, 60; and all other mill products, each 55. Previously the amounts that had to be set aside were 15 percentage points less than these new figures.

Forgings Plant May Reopen

A commercial operator for the government-owned aluminum forgings plant at Erie, Pa., is being sought by the General Services Administration. It asked all firms which had expressed an interest to submit by Mar. 30 offers to lease the plant.

The plant, which is the last inactive aluminum forging facility in the National Industrial Reserve, was operated during World War II by Aluminum Forgings Inc.

One Big Reason Why Production Levels Will Be High

HERE'S one reason why government planners think we can maintain high levels of both civilian and military production: American business expects to spend a record $23.9 billion in 1951 for new plant and equipment.

Securities & Exchange Commission and the Department of Commerce point out that 1951 estimated expenditures surpass the judgment made late in 1950 when Washington economists thought $21.6 billion would be used for capital improvements this year.

Despite Inflation — The anticipated rate exceeds by 29 per cent the capital expenditures made in 1950, and by 24 per cent the previous peak in 1948 (see the chart). At least two-thirds of the increase from 1950 represents higher physical volume. The other one-third boost is largely accounted for by inflation. Austin Co.'s quarterly index of industrial building costs advanced 3 points to 182 in the first quarter of 1951. The construction and engineering firm's index is now at an alltime high, far above the previous peak plateau of 173-174 that held in the last half of 1948 and the first part of 1949.

Manufacturing industries will expand the most in 1951 — to the tune of $11.9 billion, a 45 per cent increase over 1950 expansions. Mining companies will spend $890 million on expansion, railroads $1.5 billion, other transportation companies $620 million. All those categories will spend at least 30 per cent more than last year. Electric and gas utilities will spend $3.5 billion, or 12 per cent more; commercial and miscellaneous enterprises will spend $5.4 billion, or 10 per cent more.

Climax Soon — An estimated $5.5 billion was spent on capital improvements in the first quarter of this year. The peak in spending is expected in the second or third quarters when outlays may exceed $6 billion.

If 1951 expenditures do reach $23.9 billion this year, they will be nearly triple the outlay in 1941—$8.2 billion.

Kaiser Pegs Steel Goal

Henry J. thinks the nation will need 130 million tons of steel capacity by '55

THE NATION will need at least 130 million tons of steel capacity by 1955. So declares Henry J. Kaiser.

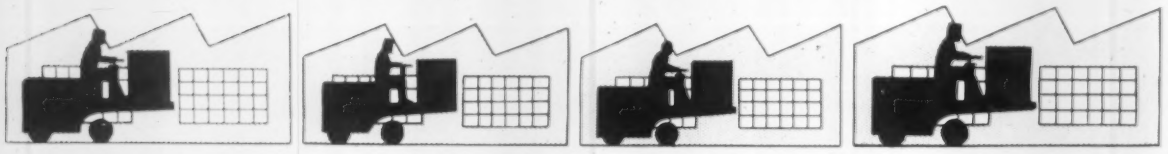
Mr. Kaiser points out the national economy has been doubling every 20 years since 1869 and can be made to continue to grow at this rate.

As for the West Coast, he says, growth ought to be twice the national average. In fact, population growth in the 11 western states in the last ten years was 5.5 million, or 41 per cent and at a rate nearly four times as fast as the rest of the country. In the next ten years, population will be up at least another 5 million, he predicts.

West Needs More — Additional steel plant facilities are needed badly on the West Coast, says Mr. Kaiser. The area uses more than 5 million tons of finished steel per year, of which 2 million tons must be imported from other areas. Additional products could be sold readily. For instance, 14 West Coast automobile assembly plants now depend largely on parts shipped in from the East, but which are being increasingly supplied by West Coast basic materials and fabricating plants. He sees no reason why entire cars cannot be made in the West when materials are available, except for the largest stampings requiring giant presses at centralized points near the centers of mass consumption.

Third Stack Planned — Mr. Kaiser has applied to NPA for a certificate of necessity covering a third 475,000-ton blast furnace at Fontana along with additional coke ovens and coal and iron ore mining facilities. He explains the need for the furnace this way: By mid-1952, the completion of additional steel making furnaces with

New Plant and Equipment Expenditures: Highest Ever



* Estimated

capacity of 470,000 tons, a new 50,000-ton U. S. Pipe and Foundry plant, plus castings for shipbuilding and other defense activities will raise far western purchased scrap and pig iron requirements by 520,000 tons to 5,005,000 tons. The deficit in metallics now is 490,000 tons and it will increase to 1,015,000 tons. Production of purchased scrap cannot be counted on to exceed the 1950 figure of 1.8 million tons.

The scrap situation is a less significant factor in the West than nationally because of the nature of local fabricating operations and the high percentage of steel products such as rails and wire products which are not processed after leaving the mill.

Aluminum Capacity Up—Kaiser Aluminum & Chemical Corp. will have capacity of 540 million pounds when a new plant with capacity of 200 million pounds is completed near New Orleans.

First line in the new facility is scheduled to start the latter part of this year and others will come into production by the middle of next year.

Kaiser Steel Gets Certificate

Kaiser Steel Corp. was granted a certificate of necessity for $22,687,392, covering, in part, facilities added to its Fontana plant in 1950 and those currently being constructed.

Of the amount, $9,583,327 applied to an 86-inch hot strip mill, electric-weld pipe mill and other facilities completed in 1950 and $13,104,065 applies to a tin plate mill and an eighth open hearth now being constructed.

Two Lean Alloys Standardized

Two series of lean alloy steels, the 81XX and modified 86XX series, and three boron-containing steels 94B17, 94B20 and 86B45 are now accorded the status of tentative standard steels by the American Iron & Steel Institute. Placing them on this status removes the extra charges which users have had to pay.

A new interim series, known as 41XX int., has also been developed in substitution of the higher molybdenum-bearing 41XX series. The new interim 41XX steels do not extend below 0.37 carbon. In lower carbon levels, AISI believes, the 86XX series has adequate hardenability.

The 94B17 and 94B20 grades are designed to have hardenability equivalent to the 4817 and 4820 grades, while 86B45 hardens to the equivalent of 4340.

T-41 (SOON M-41) HITS THE ROAD
. . . other tank-type vehicles, armored gun carriages yet to come

Army Tanks: What To Look For

As first model T-41 tank rolls from Cadillac's Cleveland production line ahead of schedule, it's revealed four other tracklaying type vehicles are to come

THREE months and four days ahead of target date, the first model of the 26-ton T-41 light tank was delivered to Undersecretary of the Army A. S. Alexander last Tuesday by Cadillac Division of General Motors Corp. at its sprawling arsenal adjoining the Cleveland airport.

Top brass from the Army and its Ordnance arm had flown in from Washington and Detroit. Several planeloads of reports and correspondents, guests of General Motors, witnessed the event.

They saw Nos. 1 and 2 lumber from the final assembly line of the 2.5 million-square-foot plant and circle a newly paved test track at 40 mph. They toured the plant to see many of the big machine tools in action on tank components. They noted several completed hulls spotted on the final line awaiting finishing touches. They heard congratulatory speeches from Undersecretary Alexander, Maj. Gen. E. L. Ford, chief of ordnance, Lieut. Gen. T. V. Larkin, assistant chief of staff for the Office of Chief of Ordnance, and Brig. Gen. D. J. Crawford, commanding officer of the Detroit Tank-Automotive Center.

Family of Five—General Crawford explained the T-41 was the first of a family of five tracklaying vehicles, all based on the same power-transmission-suspension system. A second is the T-141, a tank-type vehicle mounting twin 40-mm Bofors guns for either antiaircraft or ground action to be built shortly by Cadillac. A third is a self-propelled gun motor carriage, in 105-mm and 155-mm sizes, to be built, respectively, by American Car & Foundry Co. and Massey-Harris Co. Fourth is an armored personnel carrier, to come from International Harvester Co. and Food Machinery Corp. The fifth is a cargo (tracklaying) tractor to be furnished by Allis-Chalmers Mfg. Co. All will be in production before the end of the year.

Original schedules at Cadillac-Cleveland have been boosted by 300 per cent, and inclusion of the T-141 model has necessitated considerable revision of the first plant layout and equipment planning. But ample production space is available! The plant exceeds in floor area that of the Detroit Tank Arsenal and the Fisher Body Grand Blanc, Mich., tank arsenal combined. And both of those are enormous facilities.

Beans to Blueprints—E. W. Cole, general manager of the plant, reviewed progress at the plant since his crew of 65 engineers and production specialists descended on the former Fisher bomber plant last Au-

gust and started to survey the task ahead. Not the least part was removal of 20 million pounds of bagged beans stored for Commodity Credit Corp. The supervisory and engineering staff later was reinforced by about 150 from other General Motors divisions, notably Allison. Recruiting of engineering talent was speeded and there are now 451 in the group, working 54 hours a week. That they have been busy may be deduced from the fact 360 miles of blueprint paper has been consumed and 650,000 engineering releases were issued.

The purchasing department also has been keeping pace, so far having issued 20,000 purchase orders, including 14,000 for machines, tools and equipment. Purchases are concentrated 65 per cent in the Ohio area; 1400 subcontractors and 6000 sub-subs are participating. F. S. Philo heads the purchasing crew, and when the DO system of preferential ordering went into effect he had anticipated it by having wires ready to be sent to all suppliers, specifying DO-rating.

No Flash in the Pan—Employment at the Cleveland tank facility now has reached 3700 and this may expand to 15,000 on a three-shift basis, particularly in view of the new T-141 program currently being assimilated. No difficulty has been experienced with hiring so far. Distribution of 60,000 job application forms did no harm.

Conversion of a former aircraft plant to the manufacture of heavy equipment like tanks presented some problems. Structural reinforcements of the building were necessary in places. There was available only one-third of the requisite power and water supply. The power problem was not too tough, but building a large reservoir and pumping station had to be undertaken, as well as construction of a complete system for disposal of machining wastes, to avoid stream pollution. Expenditure of $110,000 was made to rebuild and re-equip fluorescent lighting equipment.

A completely new concept of materials handling was worked out, involving an outlay of close to $250,000 for returnable steel pallets. All incoming shipments will be palletized, as far as possible, and routed via highway trucks which will drive right into the plant proper for unloading.

Follow Through & Follow Up—A lot of machinery still has to be delivered to the plant. In one area alone, comprising only two bays, a layout sheet showed about 135 machine tools of various types spotted. Color tags are affixed as fast as the equipment is received, wired and tried out. In this area last week, 27 machines had passed the tryout stage, another 35 were wired, perhaps a dozen more received, and the rest were still on the way. Nevertheless, the equipment problem has been greatly expedited by scouring government warehouses for reserve tools and then dispatching follow-up men to stay with the machinery until it is shipped.

Close follow-up is maintained with builders of new equipment and when they have bumped into shortages of castings, motors, copper or whatnot, every effort has been made by Cadillac to expedite such items. A fast-delivery record was achieved on a 24-foot Betts boring mill which handles a complete tank hull. The only machine of its kind and size in the U. S., it was received five months after ordering.

Tanks in the Air—The light tank family of vehicles, entirely a postwar development, is designed to be airborne. While the T-41 (it will probably be given an M-41 designation any day) is classed as a light tank, its 26 tons make it comparable to a medium tank of World War II. Hull is of welded rolled armor plate. (Scores of photographers at the unveiling were cautioned that the front end design was censored, probably because Ordnance did not choose to disclose the angle of the two converging upper and lower plates. The ruling was later revoked.)

Hull top is of cast armor but the 80-inch circular turret opening makes the casting a difficult one to produce and keep straightened through heat treating. Hence it will be changed to a composite forged section, with just two small castings, which can be machine molded, in front — but not until some 250 of the present design have been completed. Ball race for the turret bearings is hardened with a unique application of induction hardening and quenching equipment, succeeding the former flame-hardening procedure.

The New Look—Other observable features: A rather high silhouette, the under surface of the hull being better than 14 inches off the ground; track tread links with a raised rubber-covered center section for smoother operation on paved roads without sacrificing the gripping action of patterned steel treads in soft going; a 76-mm high-velocity cannon in the turret; easy maneuverability through hydraulic torque converter transmission, permitting each track to be controlled independently; unusual degree of roominess for the crew.

The Cadillac-Cleveland arsenal is being groomed as a minimum 20-year facility. Co-operating closely with Ordnance in Washington and the Tank-Automotive Center in Detroit, its engineers, technicians and working force constitute no "emergency" operation. They figure they will be on the job for a long time to come. They are that certain the necessary funds will be forthcoming from the present and future congresses.

Western Foundry Sells Idle Site

An abandoned plant of Western Foundry Co. in Chicago has been sold to an undisclosed purchaser for $250,000. The 159,000-square-foot property containing three brick buildings was last operated by Western in 1946.

STRETCHING A POINT: A 72-foot addition amidships will increase capacity of the iron ore boat *Philip D. Block*, from 422,000 to 468,000 tons annually. Owned by Inland Steel Co., the vessel is being remodeled in Chicago by American Ship Building Co. and is expected back in service this spring. The hull was cut, sections pulled away, and heavy steel plates inserted to extend the keel to 672 feet

Bearing Up

Bearing makers have to extend deliveries, but they still do well despite materials shortages

USERS of antifriction bearings have fared surprisingly well thus far and hope for continued good shipments because the bearing manufacturing industry expects to produce more in 1951 than in 1950, or up to 85 per cent of the peak production in World War II.

Automotive and machinery manufacturers who buy the components in large lots find deliveries are more extended, but they still eventually get what they want. Deliveries now average at least six months, compared with three a year ago. Smaller civilian consumers who buy through distributors are also managing to get along.

Bearing jobbers are getting a flood of DO-97s for maintenance, repair and operation. The bearing industry, on the average, is shipping 25 per cent of its production to defense and defense-support programs.

Tough Job—The industry has done as well as it has up to now by beating the bushes for steel and by producing from steel in stock. Inventories today are badly unbalanced, so the usefulness of that expedient is about over. Distributors have been selling from their bearing stocks, also, but they won't be able to much longer. To Washington the industry is looking for help in getting steel —52100 and 51100 alloys, high carbon, high chromium, rings and cold drawn tubing. Low carbon flat-rolled is also required for shields and seals. More cadmium and bronze are needed too.

Major military products requiring bearings include aircraft, tanks, guided missiles, gun mounts, calculating machines and various wheeled vehicles. With the exception of aircraft and guided missile bearings, most civilian and defense specifications for the component are similar, and the industry's conversion problem is not difficult. Super precision bearings are required for the aircraft industry.

The nonessential civilian consumption of bearings has not yet been curtailed.

No Need—Manufacturers of the component point out that no shortage of their product need exist for they are operating below capacity because of materials scarcities. What's more, additional capacity will be built this year and next. Some 50 producers are in the industry, but the bulk of the output is turned out by eight companies. Census of Manufactures reports the industry did $352,501,000 worth of business in 1947.

Imports of bearings are expected to be less in 1951 than in 1950 as European makers struggle to keep up with their own domestic demand.

WESTERN METAL EXPOSITION AT OAKLAND, CALIF.
. . . the seven far western states are big primary metals producers

Machinery Pricing Simplified

The machinery pricing formula which Office of Price Stabilization is preparing for early announcement has been stripped of a number of complicating features originally contemplated.

The base price, as before, now is to be the maximum price at which the item sold in the first half of 1950. To this is to be added the increased cost of direct materials and the increased cost of factory (not just direct as before) labor. That results in the contemplated new freeze price. The formula is to be subjected to further screening and may be held up another week or so before being made effective.

Manufacturers familiar with the proposed order say that while the formula is simple, the matter of calculating the increases in costs to be added to the base price needs much further simplification if the formula is to be workable. Due to including complete instructions as to how increased costs are to be figured, the proposed order runs to 35 typewritten pages in its present form. This does not include a thick appendix listing the "machinery" items which the order is to cover.

Growth of West Pointed Up

Seven states of the far west account for 80 per cent of the nation's copper, 47 per cent of the lead, 38 per cent of the zinc and 71 per cent of the silver, delegates to the Western Metal Congress in Oakland, Calif. were reminded by James Mussatti, general manager of the California State Chamber of Commerce.

Speaking before a joint industry-technical societies forum, the chamber of commerce official also pointed to the growth of basic steel making in the seven western states. He said this capacity has increased from fewer than 1,000,000 net ingot tons in 1940 to 4,586,120 tons at the beginning of 1951.

Further expansions are under way which will substantially increase ingot capacity and finished steel products facilities, including cold rolled sheets, tin plate and various bars and shapes.

Machine Tool Pool Orders Let

The first pool orders for machine tools to aid industry speed production for national defense have been given by General Services Administration.

The orders were placed in conjunction with NPA's M-40 which establishes the pool system. These 13 manufacturers got contracts totaling $63,177,019: Barber - Colman Co., Rockford, Ill., $2,127,375; Bardons & Oliver Inc., Cleveland, $524,698; Cleveland Hobbing Machine Co., $1,059,450; Gisholt Machine Co., Madison, Wis., $12,200,750; Gleason Works, Rochester, N. Y., $3,314,422; Gear Grinding Machine Co., Detroit, $3,532,000; Gould & Eberhardt Inc., Irvington, N. J., $2,678,370; Illinois Tool Works, Chicago, $980,880; Jones & Lamson Machine Co., Springfield, Vt., $9,029,157; Michigan Tool Co., Detroit, $2,677,370; National Broach & Machine Co., Detroit, $4,452,600; Norton Co., Worcester, Mass., $8,266,072; and Warner & Swasey Co., Cleveland, $12,333,875.

Labor Pirating Hit

Tool and die manufacturers feel they need government help to retain their employees

LABOR PIRATING in the vital tool and die industry must be stopped by the government before many small shops are stripped of their best men. Loss of them will cut in half the effectiveness of these shops to produce special tooling.

This was the verdict of the National Tool & Die Manufacturers Association at a special mobilization committee meeting in New York to review the worker-shift trend in the East. A meeting to review the western situation will be held this week, and recommendations will then be presented to Wage Stabilization officials for action.

Troubles—Danger of labor pirating has been vastly increased by regulations of the Wage Stabilization Board, says George S. Eaton, executive secretary of the association. Hampering the industry especially is the practice of allowing newly organized companies to pay higher wages than established ones. Sudden emergence of big defense plants in tight labor areas is already causing dislocations. When such plants move in they get authority to offer more than the going rate for the area, on the theory that a new company will not be able to offer fringe benefits. As a result, a skilled toolmaker, vital to the small company, may move over to do a routine job in the new plant.

The idea that men under 26 cannot be highly skilled is entirely fallacious, avers Mr. Eaton. With the apprenticeship training starting at 17 or 18, he has four or five productive years as a journeyman before he reaches age 26. Already the draft is making deep inroads on this group.

Special Treatment—The committee noted the importance of retaining some kind of wage controls over small special tool and die shops as well as the larger ones, to avoid a kind of reverse labor pirating—small shops enticing workers from large companies.

Several approaches are being considered:

1. Establishment of maximum area rates for various jobs.

2. Permission for tool and contract shops to meet rates paid by mass-production shops or new contract shops.

3. Establishment of maximum area hiring rates that are low enough to discourage labor migration without good reason.

Theory—Committee members say they are not in favor of any type of regulation that would freeze men in jobs. Their problem: To achieve legal wage rates that will keep men satisfied in their present plants.

Auto Defense Orders Mean More Suppliers

AUTOMAKERS continue to receive prime contract awards calling for heavy participation by subcontracting companies. General Motors Corp. reports several that bear supplier opportunities.

Pontiac division has the best news for the smaller companies. It will design and produce a completely new cargo carrier for the Army. Initial value of the contract is $45 million, says Arnold Lenz, general manager.

Pontiac—GM technical laboratories have worked two years with Army engineers building and perfecting the experimental models, Mr. Lenz said. The carrier is tracked, equipped with stern propeller for water operations and is mobile in snow, mud, marshes and over rough terrain. Its Army name will be the Otter.

Pontiac will build the automatic transmission, chassis, and hull and will assemble the vehicle. Continental Motors Corp. already has the engine contract. Outside suppliers, about 500, reports Mr. Lenz, will subcontract the balance of the parts. Pontiac expects eventually to shift 2000 of its present force to work on the Otter in the home plant.

Another contract at Pontiac calls for production of "a large number" of Army rockets under an initial award of $12.5 million. The division estimates 32 suppliers will be needed before production starts.

Chevrolet—Chevrolet adds to its defense work a contract awarded by the St. Louis Ordnance District for quantity production of artillery ammunition. This latest commitment for Chevrolet is under a $25 million initial agreement, reports T. H. Keating, Chevrolet general manager.

Buick—Final GM division reporting on defense work last week was Buick, which will handle manufacturing operations on its Sapphire jet engine in a new plant of 580,000 square feet floor space to be built adjacent to the main division factory at Flint, Mich. Although estimated cost of the new plant was not revealed, Buick got a $25 million facilities letter when the award was made, said Ivan L. Wiles, general manager. Mr. Wiles also reported a second letter contract covering production of a large number of the engines has since been received. Site for assembly and testing has not yet been named.

Ford—Ford Motor Co. is in the defense picture again with announcement the company has purchased a 175-acre plot in Livonia, Mich., and will build a plant having 1.5 million square feet of floor space for manufacture of medium tanks.

Other reports of awards from contractors, of interest to potential subcontractors, include a commitment by Truscon Steel Co., Youngstown, where tooling is underway for production on an order for medium tank tread blocks under a $27 million subcontract awarded by Burgess-Norton Mfg. Co., Geneva, Ill. The tanks are among those to be assembled by Chrysler, Ford and Baldwin-Lima-Hamilton Corp.

Blast Furnace Output Slackens

Production by the nation's blast furnaces dropped to 5,176,334 tons in February, the American Iron & Steel Institute reports. The drop from January output of 5,984,403 tons was caused by a shorter work month and a lower operating rate—93.1 per cent of capacity.

Pig iron output totaled 5,117,603 tons, while 58,731 tons of ferromanganese and spiegeleisen were produced. The year's totals, through February, were 10,946,697 tons of pig iron, and 124,040 tons of ferromanganese and spiegel.

Crucible To Get New Coke Ovens

A new battery of 29 coke ovens will be built at the Midland, Pa., plant of Crucible Steel Co. of America by Koppers Co. Inc., Pittsburgh. Included in the contract are changes and additions to the chemical recovery equipment at the Midland coke plant.

The new battery of Koppers-Becker combination coke ovens will carbonize 490 tons of coal a day and will be underfired with either coke oven or blast furnace gas.

Texas Steel Gets Twin Boosts

Plans for further development of east Texas iron ore deposits are moving forward on two fronts. Armco Steel Corp. acquired upwards of 64,000 acres of ore land in the Cherokee county section, together with a 100-ton daily capacity government-built blast furnace at Rusk, Tex. Plans are also afoot to build a mill capable of turning out 12-foot wide plate at either Longview or Tyler, Tex.

Defense Production Administration

has granted Armco accelerated tax benefits totaling $1.5 million for expansion of iron ore development at Rusk. Sheffield Steel Corp., which has an integrated plant at Houston, is an Armco subsidiary. There has been no indication whether Armco intends to mine the Cherokee ore for processing at the Sheffield blast furnace or at the newly-acquired Rusk facility. The Rusk furnace, formerly owned and operated after the war by Valencia Iron & Chemical Co., has not been in operation for a couple of years, but there is a skeleton operating force there under the employ of Armco. The ore sources contain an estimated 50 million tons of iron.

Prospects for erection of the 1000-ton daily capacity plate mill seem bright in Texas. Backers of the mill say Washington leaders have looked with favor on the project.

STEEL's Checklist on Controls, which appears on this page every week, has been included in a comprehensive, up-to-date summary this week on page 59.

Air Reduction Expands

Air Reduction Co. Inc., New York, will build a $10 million plant to produce defense-vital calcium carbide at Calvert City, 15 miles east of Paducah, Ky.

The facility will be operated by National Carbide Co., one of Air Reduction's ten operating divisions, under the direction of Russell T. Lund. The Calvert City plant will have an initial rated capacity of 142,500 tons of calcium carbide a year. The installation will consume more than 1 million kwhr of TVA electricity per day. Lime and coke, the raw materials used to produce calcium carbide, will be brought in from nearby areas.

Apart from its use as a chemical building block, calcium carbide is the primary source of the fuel used in the oxyacetylene welding and cutting processes.

Philco Buys Indiana Plants

Three newly-completed plants in Bedford, Ind., have been bought by Philco Corp., Philadelphia. Closely adjoining on a 70-acre plot, the buildings will add about 175,000 square feet to Philco's over-all manufacturing facilities of 4.2 million square feet. The one-story plants have never been occupied. They were bought from Tecumseh Products Co., Tecumseh, Mich.; Emerson Electric Mfg. Co., St. Louis; and Acklin Metal Products, Toledo, O.

Schuman Plan Gains

The program to pool Europe's coal and steel resources may be operating by yearend

THE SCHUMAN plan to pool West European coal and steel resources may be in operation before the end of 1951.

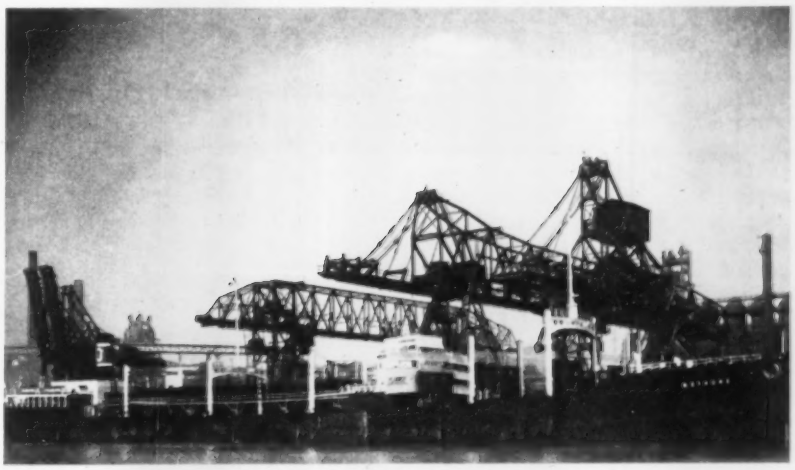
That's a possibility now that the original drafters of a workable program have agreed upon and initialed a treaty. Special ministers from the six participating countries — France, West Germany, Italy, Belgium, Luxemburg and the Netherlands — are expected to sign the pact this month. Finally, the parliaments of the participants will be called upon to ratify the agreement. No balks are expected from the legislatures, but a sudden demurral from any one of them is possible.

Three Hurdles — Three main obstacles were overcome in drafting the agreement: Nonparticipation of Britain; special conditions relating to the Belgian coal industry; and German objections to the breaking-up of the Ruhr coal and steel industry.

Britain still will not join in the program, but has been in as an observer. Belgian coal mines, many of which are high cost, will be integrated into the program on a subsidy basis. That will lower coke prices, so steel can be produced at costs comparable with those in other participating nations. Special subsidies will also be granted Italy which has a high-cost steel industry. The German coal selling organization will be broken up within two years after the treaty is ratified. Only a limited number of German steel plants will be allowed to retain control over their coal supplies in cases where mines are contiguous to the works. Those plants will not be allowed to draw more than 75 per cent of their coal supplies from that source. The powers of the International Ruhr Authority will be gradually diminished.

Evolution — A feature of the program is a five-year introductory period when the plan will gradually move into full operation. Most subsidies are expected to be dropped when the five years are up. The Schuman treaty is for 50 years. To administer the enterprise will be a High Authority, to be composed of from six to eight members, appointed for six years by the participating governments. Tenure will be staggered so that two or three new or reappointed members will be joining the authority every two years. The High Authority will be held responsible to a common assembly representing the parliaments of the participating nations. Co-ordination between the actions of the authority and the general policy of the national governments will be oiled by a council of ministers.

The main object of the plan is to create a single coal and steel market for the pooled coal and steel resources. Other nations may later join the present six participants if they wish. An estimated 150 million consumers make up the new single market. All producers will have free and equal access to markets and all consumers free and equal access to supplies. Customs duties and quantitative restrictions in regard to movements of coal and steel are to be eliminated and discriminations abolished. During periods of shortage, total resources of coal and steel, regardless of origin, will be allocated among the six countries.



PAYLOAD: First iron ore to be brought to this country from Venezuela is unloaded at the Sparrows Point, Md., plant of Bethlehem Steel Co. Carrier is the S. S. Bethore. Bethlehem blast furnaces are in background

Windows of Washington

By E. C. KREUTZBERG Washington Editor

Small companies planning to get into a pooling arrangement to do defense-rated work shouldn't wait to get their feet wet in such pools. Booking military contracts takes time

WASHINGTON'S preoccupation with efforts to help small business now is aimed at encouraging the organization of pools wherein small companies unite to obtain and execute defense contracts or subcontracts. A number of legal hurdles must be cleared before such pools can be exempted under antitrust laws. But companies planning to get into such pools shouldn't wait to get their feet wet.

It always takes some time to book a military contract, and chances are that formal exemption from the provisions of the antitrust laws will be obtainable long before contracts are ready for signatures. In fact, several pools already have been organized and are dickering with the armed services.

Word of Caution—If you plan to get into a pool, you should realize that no contracts or subcontracts will be handed to your company group on a silver platter.

Each pool must obtain its own contracts; no contract will be handed out just because of a pool arrangement. And the Defense Department has a policy of holding pool contractors just as responsible for execution of contracts as they would any independent contractor.

"Mother Hen"—That means your pool has to be well organized. Three types of organization are suggested. In one, a well-qualified member of the pool is chosen by the other members as general manager and chief executive officer. In a second, where subcontracting is sought, the contractor may be asked to run the show: That's called the "mother hen" type of management. In the third, the members set up a jointly-owned nonprofit corporation to run the pool. Those pools that already have been organized have adopted the third method by incorporating in their states.

Pool Section — Questions about pools, their status and operation, and such matters as getting contracts and subcontracts may be addressed to the party set up by the defense agencies to head the activity. He is W. O. Metcalf, chief, Pooling Section, Procurement Assistance Division, Office of Small Business, National Production Authority. Mr. Metcalf is in 2311 Temporary T Bldg., Washington 25; telephone, STerling 9200, Ext. 3235.

To Preserve RFC . . .

Fight to preserve the Reconstruction Finance Corp. as a source of loan capital for small business has been opened by a Small Manufacturers Emergency Committee. Wendell Berge, former assistant attorney general, is chairman. Initial membership includes Mott Screw Machine Products Corp., New York; Challenger Steel Products Co., Brooklyn, N. Y.; Horle Arms Co., Deep River, Conn.; Voltarc Tubes Inc., Norwalk, Conn.; Tennessee Aircraft Inc., Nashville, Tenn.; Motive Parts Co., Indianapolis; and General Die and Stamping Co., New York.

Royalty-Free Patents . . .

Companies looking for new products to manufacture should check regularly the "Register of Patents Available for Licensing or Sale," as published in the Patent Office's Official Gazette. The issue of March 20 contains some General Electric patents of special interest to the metalworking industry. Included are a wire drawing die designed for effective lubrication; a thermal process for precipitating coatings on metals; apparatus for heat treating of metal wires, filaments, etc., etc. Each issue contains a list of government-owned patents available royalty free.

Recovering Manganese . . .

Big act in the drama incident to salvaging manganese from basic open-hearth slag from lake iron ores will open about the middle of April when the experimental blast furnace of the Bureau of Mines, Pittsburgh, will begin its run. The raw material is slag with 7 to 8 per cent manganese which is to be converted into a phosphor-spiegeleisen containing around 22 per cent manganese and 4 to 5 per cent phosphorus.

It will be poured into a basic-lined Thomas converter that is to turn out a manganese synthetic slag containing 55 to 60 per cent manganese with less than 5 per cent iron and about 1/10 of 1 per cent phosphorus. That's the process the bureau will be working on over the next couple of months. If it proves successful the struggle will be virtually over, for no one doubts material containing 55 to 60 per cent manganese, less than 5 per cent iron and 0.1 per cent phosphorus, can be satisfactorily converted into ferromanganese in the blast furnace.

Importance of the development, of course, cannot be exaggerated, for the process, if successful, will permit production of 50 to 60 per cent of our total manganese requirements from slag, thus practically eliminating manganese as a critical problem.

A Watery Market . . .

A big new market for fabricated steel products—pumps, pipelines, heat exchangers, etc.,—will result if purposes of S. 5 are carried out.

S. 5 would authorize a government research program to develop a process or processes for converting sea water into potable water. The purpose is to safeguard the future water supply of growing coastal populations, notably in California, and to permit diversion for inland consumption of large quantities of fresh water now consumed by the coast cities. Desalting of water is not new; in World War II the armed services used a lot of vapor compression distillation equipment on Pacific islands and in other arid locations throughout the world.

Costs with present methods are prohibitive though; they range from 55 cents to $1.50 per 1000 gallons. Needed is an integrated series of operations that not only will produce potable water at low cost but that will salvage from sea water such items as chlorine, sulphur, magnesium, bromine, hydrochloric acid, hydrochromic acid, etc.

Directing Science Foundation . . .

Known to the metals industries, especially for his work in the field of electroplating is Dr. Alan T. Waterman, nominated by President Truman as director of the National Science Foundation. One of the nation's top physicists, he has done important work on conduction of electricity through solids. He received the nation's highest civilian award, the Medal of Merit, in 1948 for radar and other research work with the Office of Scientific Research in World War II.

By H. C. TUTTLE Detroit Editor

Mirrors of Motordom

What's the future demand for autos? Nobody knows the answer to that perennial question but right now sales are more sluggish than they have been in some months

DETROIT

SHADES OF opinion over the future state of automobile demand range from the rosiest hue to a deep, dark purple.

But some industry observers believe that the bloom is actually fading from the rose. A dealer for one of the popular priced cars a month ago was quoting delivery in four months. Today he is calling his prospects offering immediate delivery. Used car sales have not yet started their normal spring upturn. Price of used cars is a shade lower.

No Rules—Just as one swallow doesn't make a tippler, these few indications don't necessarily mean the end to an exceptionally good automotive market. There are no reliable yardsticks to measure what the normal demand for cars is. At every point when the saturation point for new cars appeared to have been reached for the last two or three years some unusual occurrence threw the calculations out of whack. The same could be true now.

Certain to have a stimulating effect on car demand will be a reduction in the production rates this quarter. The outpouring of cars to date has lulled many prospective buyers into a hold-off state. Exactly the opposite happened last fall, when buyers grew fearful that production would be sharply curtailed or cut off entirely. A situation with many similarities has developed in the television industry.

Take Your Choice—Bulk of observers hold that the present softening in car demand, both new and used, is transitory. Where stocks of cars have built up it has been caused, they say, by special factors. One of these is that some dealers held cars off the market in hopes of higher prices. Still another is that weather has been extremely bad in many sections of the country. The ever-present explanation when the others wear thin is that regulation W is the strangler.

Boomerang in Steel Curbs?

When NPA order M-47 was announced, Manly Fleischmann, NPA administrator, stated that some auto companies might choose to make smaller, less expensive cars with their reduced steel allocations. He didn't admit the possibility that some would play it the other way. It begins to look as if he had figured it wrong.

Packard is understood to be planning to concentrate on its 300 and 400 series at the expense of the smaller 200, and Cadillac is suspending production of its 61 models, the lowest priced. Cadillac, however, is also cutting out its series 75 nine-passenger sedan, demand for which has been astronomical. Cadillac says the move will simplify production processes. Chrysler and Hudson are other makers who will undoubtedly concentrate as far as is possible on their more expensive lines. Demand for the Fire-Power and H-powered cars is little short of phenomenal.

In all the above instances the effects of regulation W can be minimized easily. The buyers of these cars are not noticeably upset when they find out what the monthly payments are going to do to the budget. For some of the less expensive cars, however, the trend will be toward maximum output of the lowest price models. Kaiser-Frazer, for one, can be expected to give the edge to Henry J's. Production now is about evenly divided between Kaisers and the more economical small car.

Auto, Truck Output

U. S. and Canada

	1951	1950
January	645,688	609,878
February	658,918	505,593
March	784,000*	610,680
April		585,705
May		732,161
June		897,853
July		746,801
August		842,335
September		760,847
October		796,010
November		633,874
December		671,622

Weekly Estimates

Week Ended	1951	1950
Mar. 3	177,356	124,072
Mar. 10	180,577	124,563
Mar. 17	182,781	134,453
Mar. 24	176,390	140,196
Mar. 31	185,000	139,821

Estimates by Ward's Automotive Reports

* Preliminary.

Too Much Power

Marshall Teague, 29 year old racing driver and winner of the National Stock Car championship race, in which he wheeled a Hudson Hornet over a 160-mile course at an average speed in excess of 82 mph, told a Detroit audience that most passenger cars are overly endowed with power and short on features which would make this power safe.

Most cars, he says, are overweight and poorly balanced. Steering wheel ratios are too loose as a concession to women drivers. None of the cars has good enough brakes. Wheels are lacking in the reinforcement they need for high speed turns. "About half the accidents on our highways are caused by drivers being unable to control their cars once they've made a mistake," he asserted.

Chrysler Plagued by Walkouts

A rare opportunity, which at the same time was somewhat of a disappointment, was afforded to members of the Detroit section, junior group, of the SAE, when they toured the new DeSoto Warren plant in Dearborn.

This was the first time a group had been permitted inside the plant for its inspection, and as luck would have it it was not in operation. A short-lived dispute over the need for an extra man in one department resulted in the workers in that department walking out at lunch and not returning. The other departments were soon down and when the tour began the last of the stragglers were leaving their jobs in the various body assembly operations.

Hit-and-miss walkouts have been a frequent occurrence in Chrysler division plants of late. Few last more than part of one shift and none has resulted in formal grievance action. The fact that union shop voting has been in progress may have a bearing on these actions, although company higher-ups doubt there is any conspiracy afoot. In the case of DeSoto-Warren tie-ups one man blames it on the large number of malcontents who were sent from other plants to staff

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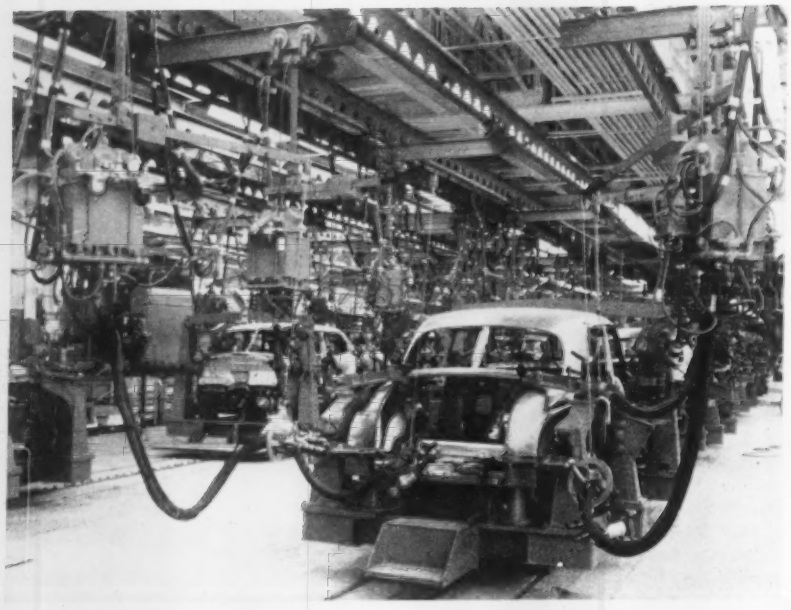


WELDING WHIZ: DeSoto's Warren avenue body plant contains 540 separate welding machines and guns. The granddaddy of them all produces 198 welds in 17 seconds

this new one when it went into operation last fall.

Whatever the cause, some of the workers are up in arms about it. One sent a petition to the international offices of the UAW asking that the officers of local 227 at the plant be removed. He claims he hasn't received a full week's pay in three months because of the disturbances.

An idle plant can be a depressing sight, but there are many features of the new Warren operation which can be better inspected at leisure, particularly since work in progress was at every conceivable stage when the walkout occurred. Even the conveyor system, which is the plant's feature attraction, is imposing in repose.

This unique system, with its eight miles of track, has been designed as a man-saver from many angles. It minimizes the amount of handling required in the body assembly operations and at the same time seeks to put the work at the best level for worker comfort. Thus tote boxes are brought down to easy loading and unloading levels and bodies are raised or inverted when under-side work is required.

One of the most impressive sights is the primer coat spray booth through which the body is conveyed, rotated and spray painted by unattended machinery. The same mechanism which turns the body contains the spray gun, and a system of cams controls the distance from the surface which this gun maintains as the body travels through the spray.

Commenting on some of the features of the plant, L. I. Woolson, DeSoto vice president, indicated that the visitors haven't seen anything yet.

Wait until the new V-8 DeSoto engine plant goes into operation at the same location. That facility will make use of transfer machinery on a scale not duplicated anywhere else in the industry, he advised.

Detroit Sees Mechanical Brains

Peculiarities of the automotive industry, particularly its traditional annual changes in product, give its engineers a special reason for being interested in automatic computing machinery. A group of computing machinery men and industrial mathematicians in Detroit last week heard how such machinery can be used in automotive applications and what is needed to make the machines more suitable to the automakers' use from Paul T. Nims, research staff engineer, Chrysler Corp.

The computational approach can be used in substitute for a large part of the usual experimental testing, he advised.

There are seven types of computing problems, both mathematical and physical, which automotive engineers are called on to solve. These he describes as substitution in formulae, sequential and iterative calculations, table look-up data reduction and automatic data taking, sorting, sets of algebraic equations, and integration. Under those headings come such problems as design of valve-opening cams in which the designer receives the required lift, duration of opening and permissible acceleration and then is called on to produce a table showing the lift to the nearest one hundred-thousandth of an inch for each degree of camshaft rotation. Another example is in the calculations for a single formate hypoid gear where about 670 items, of which a third are trigonometric functions, must be evaluated. One man, using a desk calculator, must work six days on this problem alone, he said.

The automotive industry needs all-purpose machines which feature ease of "programming"; i.e. insertion of the problem. It should not be necessary for automotive engineers to have long, specialized training in this phase of machine operation in order to make good use of them. For the industry's use the machines should be capable of rapid change from one problem to another, and for automotive engineers' needs the "blinding speed of some of the newer computers" is not necessary.

Tank Research Unit Starts

On the defense front, one of the more significant actions of recent days was the ground-breaking for the tank-automotive research center in Center Line, Mich., just west of the Detroit Arsenal. This center will be used co-operatively by Army Ordnance and by companies producing military vehicles.

A joint venture since its planning began during World War II, the research center will incorporate recommendations of the industry which were solicited by Brig. Gen. David J. Crawford in December.

Ordnance's development and engineering department, now employing more than 1000 here will be expanded 20 per cent. The center will be divided into a research and development section, an engineering service department and a components laboratory.

Studebaker Won't Talk on Jet

Studebaker hasn't yet been authorized by the Air Force to talk about its defense contract, news of which is leaking out from component suppliers.

Nevertheless it apparently has a prime contract for jet engines and has taken over the Chicago plant it used during World War II for aircraft engine parts production.

The Business Trend

Industrial production pace, holding at near-peak level that has been maintained for a month, is evidence of the big expansion in industry's capacity

INDUSTRIAL production figures are like a book; you can read a lot out of them.

STEEL's industrial production index figures for the last four weeks, for instance, are a month of evidence of the nation's vastly increased industrial production capacity. That period's index, plotted in the trend line at the top of page 68, has made a straight and level line. A straight and level line is, in itself, not remarkable. But such a line at the current heights is. Getting up to the vicinity of 221 per cent of the 1936-1939 average and holding on week after week can be done only with a greatly expanded industrial production capacity like that of this country.

Just before acquiring a steadiness, the index punched through to 225 per cent, a new alltime record. Then it leveled off to 221 for the next three weeks. Recording of 220 per cent in the latest week (the one ended Mar. 24) was also in keeping with that pattern. A year ago the index was 192.

New Record for Steel . . .

Through some of this greatly expanded capacity the steel industry was scheduled to set a new production record in the week ended Mar. 31 by turning out 2,069,000 net tons of steel for ingots and castings. That, says the American Iron & Steel Institute, is equivalent to an annual production of nearly 107 million tons. Highest previous weekly production was 2,025,000 tons in the week ended Feb. 3. The 2,069,000 tons is an increase of 48,000 from the 2,021,000 tons produced in the week ended Mar. 24.

A Car for Everybody . . .

The automobile industry is one too that doesn't have to take a back seat when production figures are discussed.

In the week ended Mar. 24, production of passenger cars and trucks in the United States and Canada were preliminarily totaled at 176,390 units, says *Ward's Automotive Reports*. Revised production figures for the preceding week are 182,781. Some of the decline in the week ended Mar. 24 is attributed to observances of Good Friday.

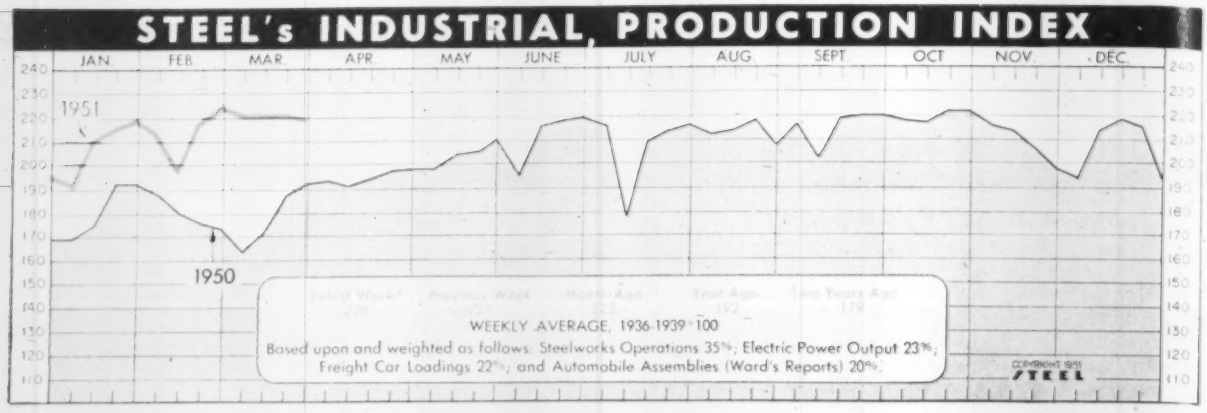
Overall there has been stability in auto production in March, and final figures are expected to show passenger car assemblies were the highest since October and truck output the greatest since March, 1948. Only a meager portion of truck output is yet devoted to military units.

It Takes Power . . .

To keep industry's production wheels whirring at the present high speeds requires huge amounts of electric power. In each week of 1951 thus far the distribution of electricity has exceeded that for the corresponding week of last year by around 15 per cent. While all classes of consumers are using more current this year, the large users, such as factories, are showing the largest gains. In January, large light and power users consumed 20.9 per cent more electricity

BAROMETERS of BUSINESS

		LATEST PERIOD*	PRIOR WEEK	MONTH AGO	YEAR AGO
INDUSTRY	Steel Ingot Output (per cent of capacity)†	100.5	99.5	99.5	96.0
	Electric Power Distributed (million kilowatt hours)	6,848	6,903	6,833	5,993
	Bituminous Coal Production (daily av.—1000 tons)	1,645	1,663	1,781	2,279
	Petroleum Production (daily av.—1000 bbl)	6,037	6,043	5,945	4,848
	Construction Volume (ENR—Unit $1,000,000)	$159.8	$220.9	$223.8	$177.3
	Automobile and Truck Output (Ward's—number units)	176,390	182,781	199,267	140,196
	*Dates on request. †Weekly capacities, net tons: 1951, 1,999,635; 1st half 1950, 1,906,268; 2nd half 1950, 1,928,721.				
TRADE	Freight Car Loadings (unit—1000 cars)	740†	745	735	717
	Business Failures (Dun & Bradstreet, number)	170	185	127	186
	Currency in Circulation (in millions of dollars)‡	$27,121	$27,167	$27,164	$26,972
	Department Store Sales (changes from like wk. a yr. ago)‡	+11%	+20%	+18%	+1%
	†Preliminary. ‡Federal Reserve Board.				
FINANCE	Bank Clearings (Dun & Bradstreet—millions)	$20,257	$17,164	$18,057	$15,827
	Federal Gross Debt (billions)	$254.8	$255.2	$256.0	$255.9
	Bond Volume, NYSE (millions)	$11.6	$23.3	$18.5	$22.8
	Stocks Sales, NYSE (thousands of shares)	5,645	10,436	7,817	9,306
	Loans and Investments (billions)†	$69.5	$69.3	$69.2	$66.9
	United States Gov't. Obligations Held (millions)†	$30,782	$30,606	$30,858	$36,877
	†Member banks, Federal Reserve System.				
PRICES	STEEL'S Weighted Finished Steel Price Index††	171.92	171.92	171.92	156.13
	STEEL'S Nonferrous Metal Price Index‡	239.2	239.2	262.3	157.4
	All Commodities†	183.9	183.4	183.3	152.4
	Metals and Metal Products†	189.3	189.3	188.7	168.5
	†Bureau of Labor Statistics Index, 1926=100. ‡1936-1939=100. ††1935-1939=100.				


STEEL's INDUSTRIAL PRODUCTION INDEX
JAN. FEB. MAR. APR. MAY JUNE JULY AUG. SEPT. OCT. NOV. DEC.
1951
1950
WEEKLY AVERAGE, 1936-1939=100
Based upon and weighted as follows: Steelworks Operations 35%; Electric Power Output 23%; Freight Car Loadings 22%; and Automobile Assemblies (Ward's Reports) 20%.
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* Week ended Mar. 24

than they did in that month last year. Residential consumption was up 14.9 per cent, while small light and power users were taking 9.3 per cent more than in January of 1950, the Edison Electric Institute reports.

Working on the Railroads . . .

In helping sustain the high rate of industrial production by providing transportation, railroads have seen a 19 per cent increase in freight car loadings this year over the comparable period of 1950. In the first 11 weeks of 1951, car loadings totaled 7,989,967, compared with 6,686,342 in the corresponding period of last year.

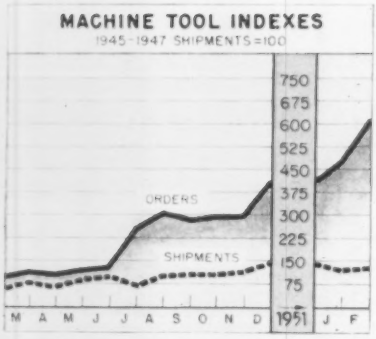
A result of the rise in car loadings is a pick-up in freight revenue. For February, 1951, estimated freight revenue was 23.2 per cent above that of February last year, which was marred, however, by work stoppages in the automobile and coal industries.

Coal Output: More Slack . . .

While most industries were straining to get out all the production possible, the bituminous coal industry's output slackened. In the second week of a decline, production was estimated by the National Coal Association at 9,870,000 net tons in the week ended Mar. 17. The preceding week's output was 9,980,000 tons. Production thus far this year is almost double that of the like period of 1950.

Washer Output Declines . . .

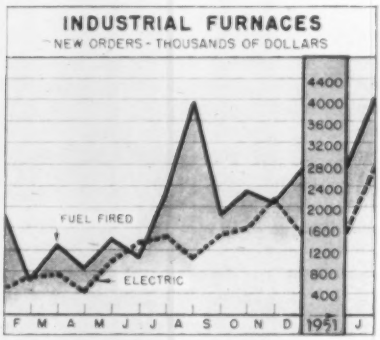
While overall industrial production is high there are exceptions to the pattern as some industries feel the pinch of government controls stemming from mobilization. The home laundry equipment industry, for instance, reports its factory sales of standard-size household washers in the first two months of 1951 aver-



Machine Tool Indexes

	New Orders 1951	New Orders 1950	Shipments 1951	Shipments 1950
Jan.	475.4	99.7	114.3	52.8
Feb.	615.8	89.2	122.2	56.1
Mar.	....	107.4	....	75.3
Apr.	....	98.9	....	61.6
May	....	116.4	....	82.5
June	....	124.1	....	91.9
July	....	253.1	....	68.3
Aug.	....	305.1	....	95.7
Sept.	....	280.6	....	101.6
Oct.	....	289.6	....	100.9
Nov.	....	291.9	....	110.9
Dec.	....	410.1	....	135.7

National Machine Tool Builders' Assn.

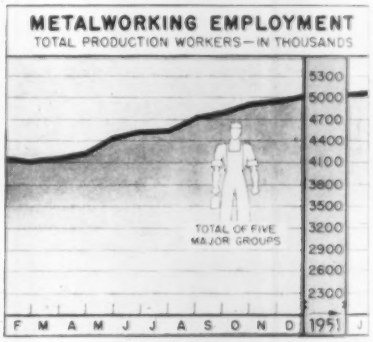


Industrial Furnaces

New Orders—Thousands of Dollars

	Fuel Fired* 1951	Fuel Fired* 1950	Electric 1951	Electric 1950
Jan.	4,033	1,914	2,764	473
Feb.	....	616	....	697
Mar.	....	1,300	....	753
Apr.	....	837	....	415
May	....	1,392	....	982
June	....	1,166	....	1,328
July	....	2,247	....	1,445
Aug.	....	3,927	....	1,039
Sept.	....	1,817	....	1,485
Oct.	....	2,306	....	1,603
Nov.	....	2,068	....	2,157
Dec.	....	2,749	....	1,505

* Except for hot rolling steel.
Industrial Furnace Mfrs. Assn.



Metalworking Employment

Production Workers—Five Major Groups

1950	Prim. Mtls.	Fab. Prod.	Mach. inery	Elec. Mch.	Trans Equip.
Jan.	963	693	937	561	978
Feb.	978	698	960	573	872
Mar.	982	709	981	580	879
Apr.	1,007	722	1,003	595	899
May	1,026	742	1,022	606	1,045
June	1,050	769	1,033	615	1,078
July	1,054	773	1,032	620	1,070
Aug.	1,086	814	1,060	655	1,118
Sept.	1,105	837	1,050	673	1,134
Oct.	1,117	850	1,104	710	1,157
Nov.	1,125	849	1,133	720	1,128
Dec.	1,142	851	1,163	723	1,151
1951					
Jan.	1,147	841	1,197	700	1,168

U. S. Bureau of Labor Statistics

Charts—Copyright 1951, STEEL

aged 331,210 units, a contra-seasonal drop of 16.6 per cent from the 397,-926-unit average reported for the last quarter of 1950.

Although washer sales of 341,328 units in February were up 6.3 per cent over 321,092 in January, they registered the first drop from the comparison month since November, 1949.

Price Index at New Peak . . .

Inflation still isn't checked. Despite government controls on prices and wages the government's wholesale price index continues to set new high records. The latest is for the week ended Mar. 20 when the index reached 183.9 per cent of the 1926 average. Principal increase occurred in farm products. The index is now 2.2 per cent above Jan. 23, 1951, and 20.7 per cent above a year ago.

Factory Employment Rises . . .

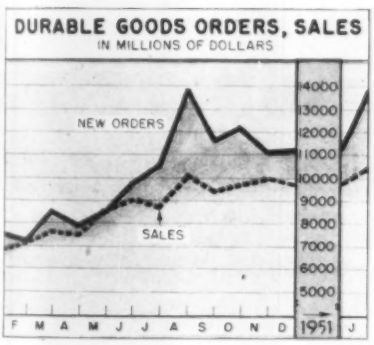
The high rate of industrial activity pushed manufacturing employment in mid-February to 15.9 million, highest level since the wartime month of June, 1945, the U. S. Bureau of Labor Statistics reports. Most of the January-to-February gain of 140,000 manufacturing jobs was in the durable goods industries, with the most pronounced increases occurring in aircraft and machinery plants.

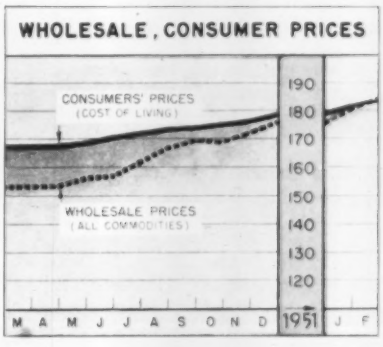
Trends Fore and Aft . . .

Kellogg Switchboard & Supply Co., Chicago, has enough defense and civilian business booked to keep its capacity in full production for the next 18 months . . . Railroads in the first half of this year are expected to lay out for equipment 51.5 per cent more than in the like period of 1950. . . . The nation's 13 million factory production workers earned an average of $64.08 per week in mid-February, or nearly $8 more than a year ago . . . Business failures fell to 599 in February, lowest level for any month since January, 1949 . . . Machine tool orders in February were the largest in nearly nine years, and were five times greater than shipments.

Issue Dates of Other FACTS and FIGURES Published by STEEL:

Construction	Mar.12	Indus. Production	Mar.19	Refrigerators	Mar.12
Employ., Steel	Mar.5	Ironers	Mar.26	Steel Castings	Feb.26
Fab. Struc. Steel	Mar.19	Malleable Cast.	Mar.12	Steel Forgings	Feb.26
Foundry Equip.	Mar.5	Pumps, New Orders	Mar.19	Steel Shipments	Mar.5
Freight Cars	Feb.26	Purchasing Power	Mar.26	Vacuum Cleaners	Mar.26
Furnaces, W. Air	Jan.22	Radio, TV	Feb.26	Wages, Metalwkg.	Mar.12
Gear Sales	Mar.19	Ranges, Elec.	Mar.12	Washers	Mar.26
Gray Iron Castings	Mar.5	Ranges, Gas	Mar.5	Water Heaters	Mar.26





Durable Goods Orders, Sales

In Millions of Dollars

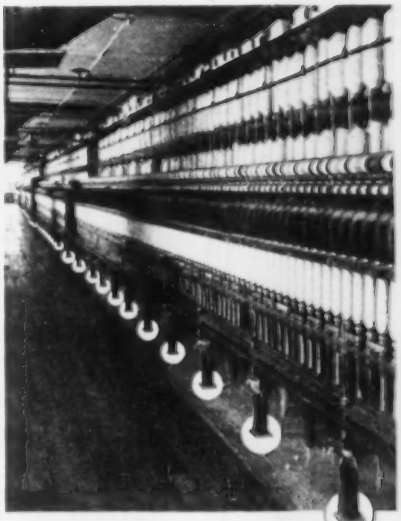
	New Orders		Sales*	
	1951	1950	1951	1950
Jan.	13,859	7,479	10,461	6,817
Feb.	....	7,213	....	7,103
Mar.	....	8,508	....	7,643
Apr.	....	7,857	....	7,488
May	....	8,514	....	8,605
June	....	9,814	....	9,030
July	....	10,553	....	8,670
Aug.	....	13,863	....	10,060
Sept.	....	11,500	....	9,392
Oct.	....	12,171	....	9,671
Nov.	....	10,621	....	9,730
Dec.	....	11,143	....	9,700

* Seasonally adjusted. U. S. Office of Business Economics

Price Indexes

	Wholesale (1926=100)		Consumers (1935-39=100)	
	1951	1950	1951	1950
Jan.	180.0	151.5	181.5	168.2
Feb.	183.6	152.7	183.8	168.9
Mar.	....	152.7	....	168.4
Apr.	....	152.9	....	168.5
May	....	155.9	....	169.3
June	....	157.3	....	170.2
July	....	162.9	....	172.0
Aug.	....	166.4	....	173.4
Sept.	....	169.5	....	174.6
Oct.	....	169.1	....	175.6
Nov.	....	171.7	....	176.4
Dec.	....	175.3	....	178.8

U. S. Bureau of Labor Statistics



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UNISORB Machine Mounting gives you these 4 important savings:

1. You use no bolts or lag screws. This saves your floors from old-fashioned, destructive hole drilling. A special cement binds UNISORB pads to the machine feet and the floor with a *minimum* holding strength of 1500 lbs. per square foot. Permanent set prevents any riding.
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Mills: Johnson City, N. Y. Millbury, Mass. Jackson, Mich. New York, N.Y.

S.E.C.O. BOOSTS PRODUCTION 22%

Sunoco Emulsifying Cutting Oil Ends Rusting, Decreases Downtime, Results in Big Savings

When an emulsifying cutting oil is unable to prevent excessive rusting on machined surfaces, that's bad. But if, in addition, it has an offensive odor, that's worse . . . especially if you have to change it twice a week and thoroughly clean the machines. Three years ago a large manufacturer of electrical products sought a solution to just such a problem. It occurred in his machining of cast iron end-bearing cages for induction motors.

His search ended when a Sun representative introduced him to Sunoco Emulsifying Cutting Oil. Not only has S.E.C.O. prevented the rusting condition, but also cutting fluid changes are now spaced six weeks apart. Translated into management language, the performance of S.E.C.O. has boosted production, curtailed costs, effected savings. By sharply decreasing downtime, it has increased output 22 percent. Savings on oil and maintenance costs are amounting to almost $5,000 a year. The manufacturer is so well satisfied with Sunoco Emulsifying Cutting Oil that he uses it now in every machine which requires a soluble oil.

In all machine shop operations, on both ferrous and nonferrous metals, you'll find Sunoco Emulsifying Cutting Oil and Sunicut straight cutting oils of real assistance. They help maintain production schedules, lengthen tool life, and keep operating costs down. For a free Sun cutting oil recommendation card, write Department S-4.

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SUNOCO

Men of Industry

JOHN D. JONES
. . . operations engineer, Brainard

John D. Jones was appointed chief operations engineer of **Brainard Steel Co.**, Warren, O., subsidiary, Sharon Steel Corp. He formerly was with Blaw-Knox Co. as production manager of roll producing facilities.

Edward J. DeWitt was elected president, **Wallace Supplies Mfg. Co.**, Chicago, to succeed the late **Emil Metterhausen. F. J. Lammers** was named to succeed Mr. Metterhausen as vice president of Wallace Tube Co. and Mr. DeWitt as vice president of the supplies manufacturing firm. Mr. Lammers is succeeded as secretary of both companies by **William J. Hannan. Robert S. Sustman** and **Earl A. Lausch** were elected assistant vice presidents.

J. R. Lewis was appointed assistant general sales manager, **Quaker Rubber Corp.**, Philadelphia, a division of H. K. Porter Inc.

Edward J. Crowe was appointed sales manager, powder metal parts division, **Keystone Carbon Co.**, St. Marys, Pa.

H. C. Kellogg, who retired last June as director of purchasing, engineering department, **Ford Motor Co.**, Dearborn, Mich., returns to join the executive staff of **John Dykstra**, vice president of the aircraft engine, tractor and machined products group.

Levinson Steel Co., Pittsburgh, elected **Morton Chatkin** and **Edward L. Hughes** as assistants to the president. Mr. Chatkin will handle special assignments connected with sales and production, and Mr. Hughes will coordinate operations and planning activities of the company.

JOHN H. TACKE
. . . Kaiser-Frazer operations mgr.

John H. Tacke was appointed operations manager of **Kaiser-Frazer Corp.**, Willow Run, Mich. **John Banks** is works manager in charge of automobile production, and **Harvey Smith** is works manager in charge of aircraft manufacturing.

J. W. Stuart was appointed New England sales representative, machine division, **Osborn Mfg Co.**, Cleveland. He formerly was foundry manager, Products Machine & Foundry Co., in Bridgeport, Conn.

Herman Sandberg was appointed superintendent of the mechanical department at **Republic Steel Corp.'s** Cleveland district to succeed the late **H. C. Jones.** Mr. Sandberg held a similar position at Republic's Buffalo district.

Eleanor E. Perks was appointed advertising manager, **Pennsylvania Flexible Metallic Tubing Co.**, Philadelphia.

Roots - Connersville Blower Corp., Connersville, Ind., one of the Dresser Industries, promoted to new positions: **E. P. Roudebush** as works manager in charge of all production activities; **D. A. Johann** as sales manager of all sales and advertising activities; and **A. E. Caudle** to assistant sales manager.

Theodore E. Spilker, secretary, was made a vice president and secretary of **Nice Ball Bearing Co.**, Philadelphia. **John E. Mullen**, formerly plant manager, was also made a vice president, and **Henry M. McAdoo**, assistant to Mr. Mullen, was promoted to plant manager.

R. B. LITTLE
. . . gen. sales mgr. at Reliance, Eaton Mfg.

R. B. Little was appointed general sales manager, Reliance Division, **Eaton Mfg. Co.**, Massillon, O. Mr. Little was with Moltrup Steel Products Co. until he joined Eaton Mfg., Reliance Division, as a New York sales representative.

Buick Motor Division, Flint, Mich., General Motors Corp., which will make the J-65 Sapphire jet engine for the Air Force, appointed **Edward C. Loppnow** its special representative at Wright Field, Dayton, O. **William C. Curry** succeeds Mr. Loppnow as zone manager at Minneapolis, and is in turn succeeded as zone manager at Milwaukee by **Robert W. Crust**, formerly assistant at Cincinnati.

Appointments at the **Fisher Body Division**, General Motors Corp., Detroit, include: **J. B. Dorn**, comptroller, Grand Blanc, Mich., tank plant; **J. D. Brooke**, assistant comptroller of the tank plant; and **E. S. Howell** as buyer in charge of purchasing for that plant.

Cutler-Hammer Inc., Milwaukee, has opened a sales office at 120 E. Third St., Charlotte, N. C., which will be staffed by **Frank A. Miller Jr.** and **C. Lee Shaw.**

A new branch office of **Foxboro Co.** was opened at 618 W. Church Ave., Knoxville, Tenn. **Marvin L. Cleaton Jr.**, formerly in charge of the Columbus, O., office, was transferred to become branch manager at Knoxville.

M. A. Ennis, formerly sales training manager, Cribben & Sexton Co., has joined the staff of **National Commit-**

tee for LP-Gas Promotion, Chicago, as employee training director.

Elmer J. Boer was added to the engineering staff of **Bituminous Coal Research Inc.**, Pittsburgh.

Kenneth W. Beckman and **Percival White** were added to the board of directors of **TelAutograph Corp.**, New York.

Jay B. Tracy Sr. was appointed manager, railroad sales and service, **General Refractories Co.**, Philadelphia.

Ellis W. Test, assistant to the president of **Pullman-Standard Car Mfg. Co.**, Chicago, has retired after 43 years of service with the company.

R. W. Kimberlin was elected to the board of directors of **Graybar Electric Co.**, New York. He has been San Francisco district manager since January, 1950.

M. K. Schnurr was named executive vice president, **Rotary Electric Steel Co.**, Detroit. He has been a vice president of the company.

A. O. Smith Corp., Milwaukee, appointed **C. R. Rigby** group executive at its Houston Works. **F. B. Dunn**, former manager at Houston, was placed in charge of personnel for both the Houston Works and the company's entire southwest district administrative area. **F. S. Cornell**, manager of the Kankakee, Ill., Works, was appointed group executive for that works, the eastern motor division at Tipp City, O., and the company's heating division, Toledo, O. He will make his headquarters at Kankakee, and continues for the present as manager there.

HAYWARD A. GAY
. . . new vice president, Cincinnati Milling

CARL M. BEACH
. . . domestic sales mgr., Cincinnati Milling

Cincinnati Milling Machine Co., Cincinnati, elected **Hayward A. Gay** vice president; **Carl M. Beach**, domestic sales manager for all machinery products; and **Carl F. Stugard as** manager of the Chicago office. Mr. Gay joined the company in 1932. In 1943 he became manager, Cimcool Division, and later of the Cincinnati Milling Products Division. About that same time he was appointed vice president and director of the mill's chemical subsidiary, Carlisle Chemical Works Inc.

Packard Motor Car Co., Detroit, appointed **C. Wayne Brownell** assistant manager of its expanded industrial relations department.

Leon A. Wortman was appointed director of advertising and sales promotion for **Audio & Video Products Corp.**, New York.

O. A. Redhair was appointed assistant director of payroll accounting for **Westinghouse Electric Corp.**, Pittsburgh, and will serve as wage and salary stabilization administrator for the corporation and subsidiaries.

Paul Richmond was appointed personnel manager, **National Motor Bearing Co.**, Redwood City, Calif.

Carl Blom, chief engineer of the pump division, **Byron Jackson Co.**, Los Angeles, was elected a vice president.

Dickey Dyer, formerly with Dyer Engineers Inc., industrial management consultant, Cleveland, has joined **Work-Factor Co.**, management consultant, New York. He will have headquarters in Cleveland.

D. W. Gunn was named equipment sales manager, and **G. V. Bureau** becomes government sales manager, Radio & TV Tube Sales Divisions of **Sylvania Electric Products Inc.**, New York.

Link-Belt Co., Chicago, appointed **Harry G. Andersen** district manager at Birmingham to succeed **J. T. Bell Jr.**, who was called back into service of U. S. Army, Corps of Engineers. Mr. Andersen was district sales engineer at Milwaukee.

M. L. Sheehan has joined **Parker Appliance Co.**, Cleveland, as industrial sales engineer representing the company in Dallas. **Raymond B. Jewett** was appointed industrial sales engineer in Philadelphia.

Elmer F. Paul was appointed manager of manufacturing, Specialty Transformer & Ballast Divisions, Ft. Wayne, Ind., **General Electric Co. K. O. William Sandberg** was appointed manager, Industrial Engineering Section, Pittsfield, Mass. **Walter C. Welsh** is communications and training man-

C. R. RIGBY
. . . group exec., A. O. Smith Corp.

F. S. CORNELL
. . . group exec., A. O. Smith Corp.

...ger employee relations division, ...mical department, Pittsfield.

...eorge M. Hollman was named man...ger, defense production division, **Al...loy Rods Co.,** with headquarters in ...York, Pa.

...amson Corp., Syracuse, N. Y., is ...pening a new Cleveland office at ...013 Detroit Ave., which will be head...quarters for the area presently cov...ered by Cleveland, Pittsburgh and ...Cincinnati offices. **John J. Egan Jr.** ...will be regional manager.

Olen E. Bee has retired as patent counsel for **Pittsburgh Plate Glass Co.,** Pittsburgh.

Charles D. Thomas was appointed by **Stanley Aviation Corp.,** Buffalo, as head of its production engineering staff.

Clarence E. Stender was elected assistant secretary-treasurer, **Pressed Steel Tank Co.,** Milwaukee.

Howard Bradow was appointed assistant superintendent of inspection in charge of manufacturing operations at **Buick Motor Division,** Flint, Mich., General Motors Corp. He succeeds **Don Taylor,** made an assistant general superintendent in charge of the production of tank transmissions.

Detroit Steel Products Co., Detroit, elected **H. D. Palmer,** vice president in charge of labor relations, a director to fill vacancy created by the death of **Murray W. Sales.**

H. GEORGE DE YOUNG
. . . works mgr. at Atlas Steel Ltd.

H. George De Young was appointed works manager of **Atlas Steels Ltd.,** Welland, Ont., Canada. He was formerly with Treadwell Engineering Co., where he was assistant to the president.

Jonathan N. Rawson was appointed director of industrial activities, **Brown & Sharpe Mfg. Co.,** Providence, R. I.

Walton B. Sommer was appointed assistant to the president, **Keystone Steel & Wire Co.,** Peoria, Ill. In 1945 he became sales manager, screw and bolt division, National Lock Co., a Keystone subsidiary at Rockford, Ill., and last fall was elected vice president of that company. In January of this year he was elected a director. He also is a director of Wire Specialties Co.

W. J. PHILLIPS
. . . joins Crucible Steel Casting

W. J. Phillips, formerly associated with Steel Founders' Society of America, will join **Crucible Steel Casting Co.,** Cleveland, Apr. 15, as chief engineer. Before accepting a position with the Steel Founders' Society, he was president of Phillips Foundry Co., Bakersfield, Calif., a firm he helped organize.

William J. Long was appointed special assistant on the staff of **J. Carlisle MacDonald,** assistant to the chairman, **United States Steel Corp.,** New York. Headquarters for research public relations, formerly located in Pittsburgh, is now established in the office of assistant to chairman at 71 Broadway, New York. Mr. Long, formerly director of research public relations, continues to handle this activity. He is assisted by **Stanley A. Orr.**

OBITUARIES...

Charles C. Wright, 77, chairman of the board of **Clevveland Tool & Supply Co.,** Cleveland, died Mar. 25. He became associated with the tool and supply company in 1909 and held various offices until he became president in 1935. He relinquished the latter position in 1949 to become chairman.

Leslie E. Sebald, vice president of engineering of the **Griscom-Russell Co.,** Chicago, died Mar. 5.

Harold O. Shepard, for many years sales engineer with **United Engineering & Foundry Co.,** Pittsburgh, died Mar. 16.

George L. Newcomb, 60, president, **Speedway Mfg. Co.,** Cicero, Ill., died Mar. 17 in St. Petersburg, Fla.

Vinton E. Sisson, 69, retired vice president in charge of patents for **Standard Railway Mfg. & Equipment Co.,** Chicago, died Mar. 18 at his home in St. Petersburg, Fla.

Robert S. Peare, 50, vice president in charge of public relations, **General Electric Co.,** Schenectady, N. Y., died Mar. 17.

G. Harold Norberg, 59, died Mar. 17. He was vice president, **Plan-O-Mill Corp.,** president of **Jansson Gage Co.,** and vice president of **Norberg Tool & Mfg. Co.,** Detroit.

John J. Wallbillich, 64, an executive of **General Motors Corp.,** Detroit, Overseas Division, died Mar. 13 in Russelheim, Germany.

George M. Bauman, 47, Cleveland sales office manager, **Aluminum Co. of America,** died Mar. 25.

George Meder, 53, sales representative, **Minneapolis-Honeywell Regulator Co.,** Minneapolis, died Mar. 17 at his home, Queens Village, Queens, N. Y.

Leland A. Proctor, 72, president and treasurer, **Stafford Iron Works Inc.,** structural steel fabricator, Worcester, Mass., died Mar. 20.

Otto Frochter, 47, president of **Alloy Welding Inc.,** Cleveland, died Mar. 24. He had headed the welding company since 1938.

J. A. Voland, president, **Golden-Anderson Valve Specialty Co.,** Pittsburgh, died Mar. 10. He had been inactive for the last year and a half. He joined the company in 1913 and assumed the presidency in 1934.

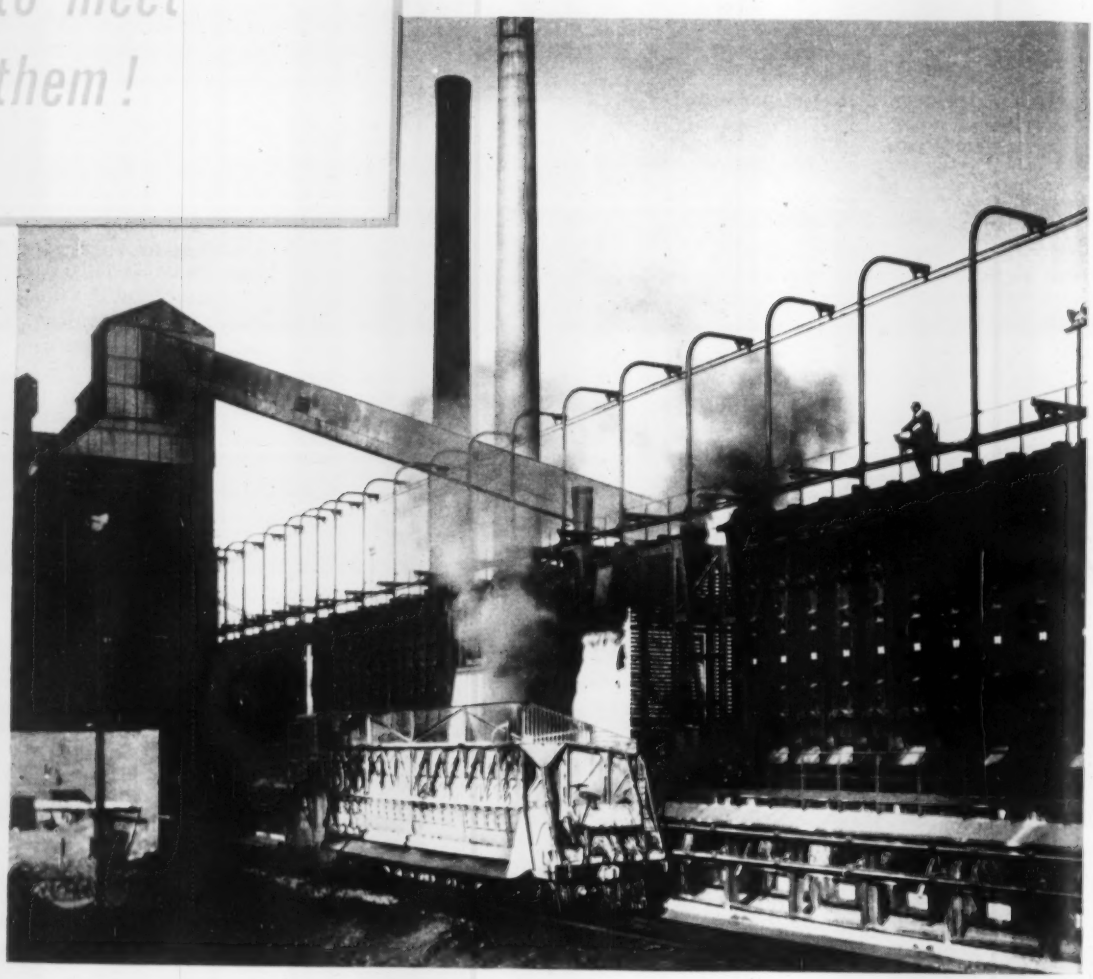
David C. Ball, 93, organizer and chairman of the board of **Oakite Products Inc.,** New York, died Mar. 23 at his home, Lake Placid, N. Y.

• Coking needs are many— so are the B&O coals to meet them!

In fields along the Baltimore & Ohio is found an abundance of Bituminous suited to every coking purpose. The principal sources are located *close to 75% of America's heavy industry!*

With this transportation advantage, plus the saving through mechanized mining and virtually unlimited reserves, you will find it pays to look into B&O Bituminous.

There is a highly efficient coking coal ideally suited to *your* needs. *Ask our man!*



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BALTIMORE & OHIO RAILROAD

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Production AND Engineering NEWS AT A GLANCE

POOL DIES AND SPECS— Swapping extrusion dies among various users may be facilitated under a new interchangeability program initiated by the Air Force as a step toward standardization of dies and specifications for aluminum and magnesium extrusions. Under the proposed setup each participating manufacturer relinquishes proprietary rights to his own extrusion dies which then become available to any other participating contractor or government agency having need for them. Also the Air Materiel Command will screen and catalog all active aircraft extrusion shapes, making one ready information file for use by industry. The Navy and various aluminum, magnesium and aircraft associations share sponsorship.

SHINE WILL STAY—Your 1951 automobile will continue to have bright metal trim, despite the clamps placed on use of nickel for plating. Several detours around conventional copper-nickel-chrome plating have been opened and will be traveled. One, for example, is zinc plating, followed by a brightener dip and a coating of clear synthetic lacquer. —p. 81

TV SET MAKERS SHOW HOW— Manufacturers bumping up against materials shortages, government restrictions, cutbacks, allocations and the like in the metals industries are being pretty cagey over talking about how they are getting around them. Direct requests for information on substitute and alternate materials frequently are met with stony silence. Not so in the case of television receivers where a long list of alternate specifications has been worked out to conserve critical metals. New circuits and new picture-tube focusing systems have played a part. Clarity of reception is claimed even better. —p. 78

ADHESION IS IMPROVED—Bonding of rubber to metal without the need for brass surfacing the metal or the use of costly adhesives is accomplished by the British-developed Redux process. It involves treating the rubber surface with concentrated sulphuric acid for about 4 minutes, then thoroughly washing it in water and drying. This induces a chemical change to the surface, hardening it a little and resulting in fine cracks or "crazing" upon bending. The treated rubber and cleaned metal surfaces next are coated with a liquid resin, dipped in a special powder and clamped together under 50 psi pressure at 140° C for 20 minutes. A variation of the procedure is recommended for soft rubbers, and adhesion is not restricted to metals.

AN INSIDE LOOK— Deterioration of refractory linings in hot metal cars and mixers varies widely according to service demands placed on the equipment. It is not necessarily a matter of how much tonnage is being handled; high temperatures and the presence of reducing gas are the principal factors. Excessively hot casts from the blast furnace may increase slag fluidity and corrosion to the point where partially neutralized slag is washed off lining brick, thereby exposing a fresh surface to attack. STEEL is publishing a series of four significant articles dealing with studies made on a large number of mixer and car linings, to see "what cooks". —p. 93

MEMO ON CORROSION— No systematic relationship exists between open-circuit potential measurements and resistance to corrosion, according to recent research studies. Polarization effects rather than open-circuit potentials exert the major influence on the extent of corrosion in galvanic couples. A correlated phenomenon is "area effect", demonstrated by the complete destruction in salt water of steel rivets used to join copper plates and the satisfactory behavior of a combination of copper rivets in steel plates.

CULLED AND COMBED: Porcelain-enameled mild steel to replace stainless steel in manifolds and mufflers of combat vehicle engines is being investigated as one means of conserving critical alloys . . . Addition of 2 per cent tincture of iodine solution in the amount of 1 per cent by volume to a 5 per cent sulphuric acid pickling bath results in a 95 per cent retardation of the acid's attack on bare steel, without affecting the rate of dissolution of rust on the metal, according to tests made at Fort Bliss, Tex., ordnance laboratory . . . Observes Britain's *Punch*: "It is not absolutely necessary to have a research department—at least not one of your own. In fact probably the most efficient and economical type of research department is an employe you can really trust working in the research department of your principal competitors" . . . Hot extrusion of a 400-pound slug of chrome-nickel-molybdenum steel in a 5500-ton press to form a 200-pound 10-foot propeller blade tube is well beyond the experimental stage (p. 86) . . . Army Ordnance says all cartridge cases, from 20-mm up to 120-mm, will eventually be specified in steel, to conserve brass. —*A.H.A.*

Metalworking Outlook—p. 41 *Market Outlook—p. 143*

By A. H. ALLEN
Associate Editor, STEEL

Critical Metals Usage Slashed

Cobalt eliminated and major economies effected in requirements for transformer steel, aluminum, copper, nickel and "ferrite". Quality is not sacrificed; cost increase is minor

PRESSURES of an emergency often drive into the open manufacturing techniques and materials utilization that ordinarily might have been delayed for years, or perhaps never put into effect. When the supply of materials becomes cut off by government edict, it is either develop something else or go out of business. Ingenuity usually makes it the former and the net result is uninterrupted production, possibly with no sacrifice of quality or increase in cost, maybe even improved quality and lower cost.

A case in point is the television industry which last year turned out the record volume of 7,463,800 receivers and figures to do something close to that this year. Now, two years ago, the management of Philco Corp. initiated a long-range program of research and engineering development, with the idea of developing a receiver with improved performance at no increase in price, despite rising costs. Considerable success had been achieved by last summer, when it became apparent many materials would become scarce because of the accelerated defense program. So, at that time, the scope of the development effort was broadened to include conservation of critical materials.

On Feb. 14, Philco demonstrated to NPA officials in Washington the culmination of the program, an entirely new receiver, re-engineered and field tested, which eliminated the use of Alnico 5 (containing 24 per cent cobalt, 14 nickel, 8 aluminum and 3 copper) permanent magnets, and cut aluminum use by 68 per cent, copper by 26, ferrite (20 per cent nickel oxide, 25 zinc oxide and balance iron powder) by 51, silicon steel by 58, tin by 50 and zinc by 75. Total chassis weight was reduced from 39.63 to 27.5 pounds, or about 31 per cent.

Permanent Magnets Out—How was it done? Like this: *Alnico* 5 was eliminated by replacing the permanent magnet speaker with an electromagnetic speaker; using an electrostatic focusing circuit instead of a permanent magnet focuser; and changing to Alnico 3 (no cobalt) in the beam bender.

Aluminum in frame assembly straps for the picture tube was replaced with fabric; protective cup over the end of the tube became plastic-and-fiber. One electrolytic condenser containing aluminum foil was eliminated by the electrostatic-focus tube, and the amount of foil in other electrolytic condensers was trimmed by use of lower voltage power supply. Savings per receiver—0.563-pound.

Copper requirements were reduced 1.236 pounds per receiver (taking 17-inch tube size as average) by replacing the large power transformer with much smaller filament transformers and a voltage doubler power supply using selenium rectifiers; by reducing

in Revised Television Circuits

FROM industrial research laboratories have come the answers to metals shortages growing out of the defense effort. A close look at metal structures, like this General Motors research technician gets from the electron microscope (see cover), may suggest suitable alternate materials, the selection of which, on occasion, has been both fortuitous and effective. Periodic table of elements courtesy Science Service

the amount of wire in audio output transformer and compensating to maintain sound quality; by changing from 22-gage to 24-gage hookup wire throughout the chassis; by shortening wire leads on tubular and mica condensers; by removing width and linearity coils as a result of new deflection circuits; by reducing the size of the horizontal output transformer through use of new circuits, including a new 6V3 damper tube; and by replacing copper ribbon-type ground straps with wire.

Ferrite has been cut by better than half through these three steps: Replacing a ferrite core in the deflection yoke with a new yoke of flake iron, trimming size of the horizontal output transformer core by means of new circuits and diode damper tube; and eliminating width and linearity control cores in the new circuits which include resistor-type width control and need no linearity control.

Silicon steel has been conserved to the extent of 7.399 pounds per receiver by the elimination of the large power transformer and cutting the size of the audio transformer core.

Tin is saved by the switch to a 20 per cent instead of 40 per cent tin solder, used with a new flux.

Zinc is being conserved by eliminating some die casting, notably one in the focuser; by the savings noted under ferrite; and by dispensing with brass wherever possible. All brass hardware and machine screw parts are being replaced by steel where feasible. Brass in control bushing has been cut 10 per cent, and all decorative brass trim on cabinets is out.

Cadmium has been saved by changing finishing specifications on chassis and other metal parts from cadmium plate to lacquer coating, where soldering requirements permit.

Extended to Other Equipment—Philco engineers have been pushing conservation efforts in other directions—receiving tubes, picture tubes, antennas, automatic record changers, radios, refrigerators, room air conditioners and electric ranges. Details are lacking, except for tubes and record changers.

In receiving tubes, wherever possible carbonized nickel-plated steel strip is being substituted for solid nickel, and research is going forward on the adaptation of aluminum-clad steel for plate elements to eliminate nickel completely. This has already been done in Europe, and progress in the U. S. awaits only a supply of the clad steel strip. Further, nipron

Comparison of old and new television chassis, the new one at the right being 12.12 pounds or 31 per cent lighter than the old, and at the same time conserving aluminum by 68 per cent, silicon steel by 58 per cent, ferrite by 51, copper by 26 and nickel by 15 as well as eliminating cobalt. Features are a new power supply, including two selenium rectifiers in a voltage doubler circuit, a new electrostatic-focus picture tube and more economical horizontal and vertical deflection circuits

nickel-plated iron wire—is being used for inside stem leads to replace nickel, and eventually will be extended to outside stem leads.

In cathode ray picture tubes, inside stem leads of nipron save 60-70 per cent of the nickel formerly used in this application. Also, Philco has changed the bulb-spacer design in 90 per cent of these tubes, reducing the use of 18-12 stainless steel by 50 per cent. The gun design on one type of picture tube has been changed, to lower the amount of 18-12 stainless required by 70 per cent.

Standard television antenna masts for the past eight months have been of steel tubing in 5 and 6-foot lengths, 1¼-inch OD and 0.030-inch wall thickness, replacing former 6-foot aluminum masts. Cross arms in deluxe-type Philco antennas were changed to steel on Mar. 1. Duralumin or butt-seam welded aluminum in receiving elements and hardware for antennas have been changed to steel. Galvanizing these elements has given way to special types of rust-proofing and painting. Even lead-in wires have been changed from seven-strand No. 28 copper wire to No. 30, saving 33 per cent.

Development of alternate metal components—steel stampings for die castings, etc.—for automatic record changers points to complete elimination of aluminum, brass and phosphor bronze, an 83.5 per cent reduction in zinc and 50 per cent cut in stainless steel.

High Production Multiplies Economies

Same Pattern at RCA—Engineers of Radio Corp. of America have pursued similar work in the development of new television chassis and tubes, and have now turned over to the industry results of their eight-month emergency-intensified work. Basic idea has been to maintain product quality and performance by taking advantage of noncritical materials.

The following tabulation is a summary of RCA's savings based on production of 1 million 17-inch television receivers, including savings which are expected to result from the application of electrostatic focused kinescopes:

Material	Pounds saved, compared to last six months of 1950, in typical 16-17-inch television, per 1,000,000 sets, with electrostatic focused kinescope.
Alnico 5* speaker Saving based on 2.5-oz. magnet 8-inch table model speaker	72,000
Alnico 5* speaker Saving based on 3.16-oz. magnet 12-inch console speaker	135,000
Alnico 5* focus magnet	310,000
Alnico 5* beam bender	4,400
Steel in 12-inch speaker	142,000
Brass in 12-inch speaker	50,000
Zinc in focus magnet	310,000
Steel in focus magnet	500,000
Brass in focus magnet	22,000
Aluminum cup over back of kinescope	62,000
Brass in volume controls	12,200
Copper shorting band in power transformer	190,000
Copper hook-up wire	47,000
Copper leads on paper and ceramic capacitors	11,850
Aluminum shield	100,000

* Alnico 5 contains approximately 24 per cent cobalt, 14 nickel, 8 aluminum, 3 copper and 51 iron.

The following summarizes metal savings in effect in the manufacture of tubes and ferrite magnetic cores used in the manufacture of 1 million television receivers. A typical 23-tube television receiver was used in these calculations:

Material	*Savings per 1,000,000 receivers*
Nickel content in ferrite cores	12,400 pounds
Nickel in receiving tubes and kinescopes	33,600 pounds
Copper in receiving tubes and kinescopes	33,000 pounds
Tin content in solder	50 pounds

The problem of reducing or eliminating cobalt in speakers might have been solved by changing to an electromagnetic speaker, as did Philco. This would have resulted in the addition of approximately 1 pound of copper for the field coil. Instead, RCA considered it more advisable to retain the Alnico 5 magnet, but to reduce its size as much as possible consistent with maintaining acceptable performance. A complete study and redesign of speakers was made with the result that the largest magnet now used is 1 ounce and the average is approximately 0.75-ounce. This redesign also resulted in a saving in the accompanying steel and brass parts.

A reduction of Alnico used in the focusing magnet of the kinescopes is a slightly longer range change which is being actively developed. The focus magnet can be removed completely by continuing the use of electromagnetic focused kinescopes with electromagnetic focusing coil, or by changing to electrostatic focused kinescopes.

The timing for introducing electrostatic focusing in production is determined by the availability of kinescopes, since they must be changed to permit this type of operation. The 17-inch rectangular sets (largest item of production in the industry this year) will be changed to electrostatic focusing in the second quarter of 1951. By the end of the second quarter of 1951 it is planned to be completely changed over on all sets. The resultant unit saving is 5 ounces of Alnico 5, approximately 5 ounces of zinc, and approximately 8 ounces of steel.

Squeeze on Red Metal—RCA has effected copper savings in various ways. Power transformers originally specified a shorting band 40 mils thick and approximately 2 inches wide. The specifications have been changed, cutting the thickness in half, with a resultant saving of 0.19-pound per transformer. Hook-up wire has been reduced from 22 to 24-gage, resulting in a saving of 33 per cent in the amount of copper used. Certain screw machine parts which are used in a 45-rpm record changer and other places, and originally of brass, are now of steel.

For future designs RCA is directing efforts toward improved components and circuit efficiency, in order to reduce further the amount of materials used. Except for the power transformer, the deflection yoke is the largest component user of copper. Design work has been under way for some time to effect a saving here, and a model using only 50 per cent of the usual amount of copper in the high-voltage coil and yoke appears promising. This in turn will still further reduce the amount of copper in the power transformer by an appreciable amount. The chassis size and depth then can also be reduced. Another important com-

ponent used in a receiver is the ferrite cores, used as a magnetic core material in deflection yokes, I-F coils, etc. Throughout the past eight months engineers have been engaged in an active program to conserve nickel oxide in ferrites by changes in the chemical and metallurgical formulation of the ferrite. A change in formulation from 13 per cent to 10 per cent NiO has been developed and, after final tests on end products, went into production in February. Additional engineering and laboratory work to reduce NiO consumption by another 50 per cent is now in process and is expected to be effected in the second quarter. This is based upon a formulation using magnesium oxide to replace a certain amount of the nickel oxide, reducing the NiO content to only 5 per cent.

After three years of effort a new plate (anode) material has been developed and tested to the point where it seems to meet all of the requirements of a substitute for pure nickel strip in tube manufacturing. This new material, known as S8S1, is produced by RCA. The raw material, aluminum-killed cold-rolled steel strip, 10 per cent nickel-plated, is coated with nickel oxide, which is then bonded to the strip and carbonized.

In some applications a satisfactory carbonized strip can be made using the foregoing process of nickel-oxide coating and carbonizing, but without nickel plating the base material.

Nickel-Plated Iron Wire—Nipron is now being used widely by RCA as a substitute for pure nickel wire in the manufacture of a significant number of electron tube components. Furthermore, 18-12 stainless steel wire is being replaced by 18-8 wherever possible. In addition, the attempt is being made to substitute 18-8 stainless steel wire for nickel wire in certain non-critical tube components, such as getter loops.

The quantity of copper used in tubes is relatively small as compared to circuit and component uses. Approximately 90 per cent of total copper requirements for receiving-type tubes is for use as copper grid side rods which are used in about 10 per cent of the tubes produced. It now appears that during the first quarter of 1951 a 30 per cent reduction can be realized in present usage of copper grid side rods through further adaptation of nickel-plated iron wires. Copper is also used in the lead wires which connect the elements of the tube to the base and it now appears possible to effect a saving of approximately 19 per cent in the use of copper for this purpose by a reduction in diameter.

Principal use of copper in cathode-ray tubes is in the exhaust tubulation which is "pinched-off" upon completion of evacuation of the tube. A program for the substitution of glass for copper is under way. Primary usage of copper in transmitting and power tube types is for anodes and radiators. High electrical and thermal conductivity is required in order to dissipate the great amount of heat generated in such types. No satisfactory substitute for oxygen-free, high-conductivity copper is currently known. It should be noted, however, that nearly all tubes of this type are used in such essential applications as commercial communications, broadcasting, industrial oscillators and the like.

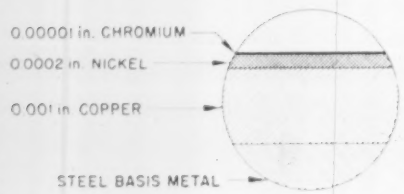
Ingenuity of metallurgists and materials specialists confronted with arbitrary restrictions on critical metals in civilian goods manufacture is a wholesome thing to watch, as the foregoing review of recent developments in the television industry may suggest. Turning to another materials problem, that of metals for electroplating, similar encouraging progress has been made, as the following discussion will demonstrate. Both may suggest answers to bottlenecks in which other manufacturers are becoming stuck

What Platers Can Do About the Nickel Shortage

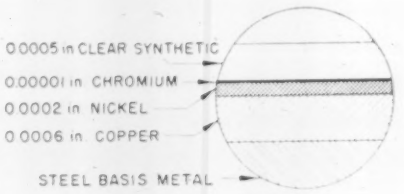
Variety of plating and coating techniques available where restrictions on nickel for plating make conventional copper-nickel-chrome finishes impossible

RESTRICTIONS on nickel for plating, imposed by order M-14 and amendments, issued by NPA, have caused a flurry of activity in the past few months to find methods and materials which would permit continuing manufacture of bright-plated parts, conventionally carrying the copper-nickel-chrome type of plating. Particularly in the automotive and auto parts industries which account for a large volume of chrome plating has this search been pushed at fever pitch, in view of the NPA ban on nickel plating in a long list of specific decorative items. This took effect on Mar. 1, although it was relaxed at the last minute to permit use of nickel anode stocks in the hands of platers. This respite, while most welcome, does not solve the problem for sooner or later the supply of nickel for plating nonessential items will be exhausted. And at the same time sharp cuts have been made in permissible nickel use on parts where it is considered functional.

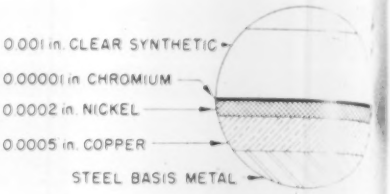
So the rush for alternate finishing treatments is on. One of the most obvious changes is to chrome plate directly on straight-chromium stainless steel. This has been done widely in recent years by the automobile industry, but solely for the purpose of color matching stainless steel moldings and trim with other chrome-plated parts, such as bumpers, hardware and the like. The chrome in this case is just a flash over the stainless. The treatment is not universal through the auto industry, Packard for example, being content to leave its various stainless steel moldings unplated, feeling that few people will notice the slightly yellowish tinge to the highly-



Diagrammatic cross section showing copper substituted for two-thirds of nickel plate



Here clear synthetic is applied over the chrome plate and the nickel deposit cut two thirds



Still more synthetic may be applied where conditions of high humidity make it advisable

buffed parts, and that the cost savings outweigh any possible objections.

According to engineers of United Chromium Inc., Detroit and New York, 18-8 chrome-nickel stainless steel has slightly better corrosion resistance than the straight-chromium grade, but the two become practically equal when a flash chrome is given the latter type. One difficulty has been that in plating chromium on stainless steel from ordinary solutions it came out milky, requiring a finish buff. Use of UCC's self-regulating high-speed chromium solution (STEEL, Oct. 16, p. 98) is claimed to overcome this tendency toward milkiness.

A number of other suggestions have been advanced to alleviate or circumvent the tightening situation in nickel for plating. Five are summarized as follows, with sketches on these two pages highspotting the procedures in magnified form:

Less Nickel, More Copper—Some engineers, believing that copper and nickel have about equal value in protecting steel against corrosion, specify combined thickness of copper and nickel instead of individual thicknesses. One specification for chrome-plated steel parts in outdoor service calls for 0.00065-inch copper, 0.0006-inch nickel and 0.00001-inch chromium. This is known as an FS plate, good for 72 hours of continuous exposure in salt spray. Reliable corrosion tests can be cited to show nickel provides greater protection than copper, and some plating specialists maintain that anything less than 0.001-inch of nickel means poor corrosion protection. In the present emergency, of course, there is the tendency to gloss over the importance of nickel and simply plate on more copper, as in the first example where copper replaces two-thirds of the nickel called for in the previous specification. One problem, where a high volume of plating work must be handled, is the changing of solution tanks, power circuits, conveyor equipment and time cycles which obviously will be completely different in view of the much thicker copper plate required.

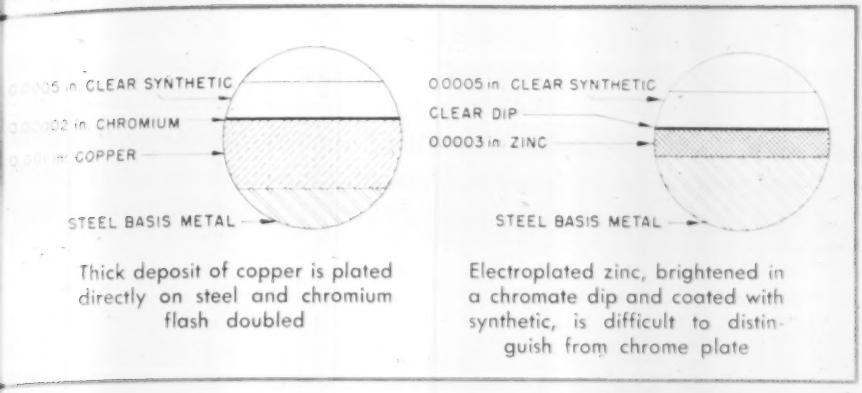
Less Nickel + Clear Synthetic—Another method of compensating for less nickel is to leave the copper base plate unchanged at 0.0006-inch, cut nickel to one-third of the normal spec, and apply a surface coating of 0.0005-inch clear synthetic lacquer as diagrammed in the second sketch. Air-drying nitrocellulose-acrylic lacquers are being used successfully in this instance, although urea-formaldehyde clear baked synthetics give longer wear and better corrosion resistance. Low-priced articles of brass have been plated with nickel only 0.0001-inch thick, and a satisfactory product for indoor use can be given as little as 0.00005-inch nickel, coated with a clear lacquer.

Less Nickel, More Synthetic—On parts such as refrigerator shelves which must withstand high humidity, clear synthetics have been used regularly over copper-nickel-chromium plate to furnish added protection. Cutting back nickel to, say, 0.0002-inch may be compensated for by doubling the thickness of synthetic, to 0.001-inch, as indicated in the third example. Baking synthetic of the urea-formaldehyde composition is recommended in this case.

Copper, Chromium and Synthetic—In certain applications, such as those where no exposure to weather or humidity conditions is involved, nickel can be eliminated altogether and the steel plated with a heavy layer of copper, perhaps 0.001-inch, plus a 0.00002-inch flash of chromium. It is usually necessary to buff the copper pretty thoroughly in order to get a smooth surface for the chromium which is so thin that any irregularities in the copper will show through. Depending upon the service involved, the copper-chromium plate may or may not be given a coat of clear lacquer; the fourth example sketched calls for half a thousandth of synthetic.

Zinc + Brightener + Synthetic—One of the most attractive alternate plating methods automotive platers have come across is depicted in the fifth sketch and involves electroplating of 0.0002-0.0005-inch of zinc directly on steel, followed by a dip in a special chromate-type solution which both brightens and increases corrosion resistance of the zinc deposit. Following the brightening and passivating treatment, a clear baking synthetic is applied and, in the opinion of many, the result is difficult to distinguish from chrome plate.

A switch to this type of finish, contingent upon a supply of electrolytic zinc of course, permits continued production of bright plated parts with a 50-70 per cent saving in plated metal over the conventional 0.001-inch of copper and nickel. A leading bicycle manufacturer has replaced nickel plate with the combination of zinc plate and chromate brightener, discovering that the alternate finish not only has improved corrosion resistance but greater sales



Thick deposit of copper is plated directly on steel and chromium flash doubled

Electroplated zinc, brightened in a chromate dip and coated with synthetic, is difficult to distinguish from chrome plate

appeal because of its chromium-like appearance.

Stopoff lacquers used to prevent metal from plating where it is not wanted or needed usually are removed after plating. Now metal finishers are developing a method of using stopoff lacquer on the reverse sides or backs of parts to save nickel, and then leaving on the lacquer as a rust-resistant final finish. An example is the automobile radiator grille of stamped steel on which a lustrous finish is required only on the outer surface. Stopoff lacquer on the concealed surfaces reduces the amount of plating metal needed.

The nickel shortage has provided the opportunity to promote finishes other than the widely used chrome plate, particularly color finishes. Copper plating of steel parts, with a protective lacquer coating might be one example. One of the newer refrigerator models has interior trim finished in copper plate and clear lacquer. Another manufacturer is developing a line of steel kitchen utensils, copper plated and finished in a wear-resistant baking synthetic.

Still another finishing procedure which some of the tubular furniture manufacturers have O.K.'d comprises a deposit of 0.0001-0.0002-inch of chromium directly on the steel, plus a baked clear synthetic. In certain other applications clear and tinted synthetic coatings applied directly to steel and zinc-base die castings are getting serious consideration.

Success of the direct chromium application is dependent on a good baking synthetic lacquer to seal cracks in the chromium plate. United Chromium reports the use of its B-159 synthetic on chromium-plated steel panels has withstood 500 hours in 100 per cent humidity at 100°F, and also has withstood 500 hours in a standard salt spray without signs of failure.

Outlook Is Bleak—As long as nickel continues to be stockpiled at a furious pace and as long as the military continues to talk in terms of 18,000-20,000 jet engines a month there is not going to be enough metal for platers. Aircraft engine research is being directed toward reducing the amount of critical metals in blades, disks and casings of jet engines, but there is no great pressure on this work since in time of emergency aircraft engine builders can have pretty much whatever they want as far as alloys are concerned. At the same time, there are no indications of any letup in government stockpiling of nickel. Before Korea, the set-aside was supposed to be 1 million pounds a month, although actually this was allowed to drop to only a fraction of that amount. Starting last July, however, orders went out to resume stockpiling at the full amount and to make up deficiencies of past months. This put the finger on civilian nickel.

What has happened since then is cloaked under the convenient mantle of "military security." In any event, stockpiles are growing to mountainous proportions, even though the source of almost all nickel used in the U. S. is across a friendly Canadian border.

It is understood that pressure is being applied to International Nickel Co. by the government to build a new refinery along Lake Erie in northeastern Ohio, in order to step up production of the pure metal. This, of course, would be years away from meeting nickel demands of the moment, although conceivably the move could mean easing up on stockpiling and free more metal for civilian use, particularly for the hard-pressed platers.

Trim Aluminum, Copper, Zinc Parts in Vacuum Cleaners

MATERIALS conservations steps developed by a leading manufacturer of vacuum cleaners have been keyed to maintenance of quality and performance in the product. Some aluminum components have been replaced by plastics and where possible all aluminum parts are being redesigned for either plastics or steel or a combination. This program requires building experimental models, complete new production tooling and an obvious time lag of approximately six to eight months for preparatory work before conservation models are ready.

All nonfunctional, nonelectrical uses of copper and copper alloys are being changed to steel. Motor commutators are being switched to a plastic-copper type, manufactured in England and imported, with shipments starting last month.

Zinc plating has been reduced by the use of enamels and other organic-type surface finishes. Zinc die castings are being eliminated by first changing to aluminum and later to plastics. Component parts are being interchanged on models to use those which have the smallest zinc castings.

All nickel plated parts have been reviewed and enough of them changed to enamel finishes to conform to nickel restrictions imposed by NPA order M-14 and amendments. All cadmium plating has been discontinued, supplanted by either zinc plating (permissible substitute for cadmium) or enamel surface finishes.

Seen and Heard in

The Machinery Field

By GUY HUBBARD,
Machine Tool Editor

EVERY PLANT A SHANGRI-LA: From reading what used to be the classified pages—but which now in many cases can well be described as "semi-display help-wanted pages" in our metropolitan dailies, I get the impression that practically every metalworking plant in the United States is a bit of Shangri-La.

The object of this heavy advertising primarily is to attract to these plants a lot of skilled persons—production, toolmaking and engineering—to further the national production program. Inasmuch as people of that caliber—except in periods of acute depression—are employed at their respective trades or professions and not on farms or in hotels or even automobile repair shops, it seems on the face of it that a big drive is underway to attract such people to leave the place where they are to go to what is represented to be a better place.

It has been in the blood of journeymen craftsmen for centuries to gain experience through journeying from one industrial center to another as a means for attaining skill and experience. Except for rolling stones like the oldtime "tramp printers" for instance, there came a day however when these journeymen ceased to journey and settled down to live out their lives and to exercise their skills in some one community and in some one plant which were to their liking and which liked them.

Only in thaf way has the relative stability of industrial conditions in some of the great machine tool centers been achieved. Those industries could not have developed had their manpower been made up of "rolling stones"—and I certainly do not mean to imply that these industries have been gathering moss. They have been gathering stabilized experience.

I find now that many of the younger men—and some of the older ones as well—in the old established industries, are eyeing some of these alluring advertisements in the same spirit that some of us used to eye the raspberry bushes on the other side of the stone wall. Somehow the berries always looked bigger and more numerous than on the bushes on which we currently were working. Experience over the years generally proved that they were no better—no worse.

Several machinery men lately have asked me what they might do to counteract the published attractions of these industrial Shangri-Las "on the other side of the wall." The best answer that I can think of is: Make a comparable drive of the same kind to sell your own people on the idea that your plant too is a Shangri-La—or at least a reasonably good place to work, wherein good work is in the best national interests.

There are many things to be considered before pulling up stakes but unfortunately not all good workmen consider them in times like these. Therefore they should be reminded of them in every possible way. If advertising is the way—and those who seek your people seem to think it is—then resort to advertising *to your own people.*

"It must be true because I read it in the paper" is a statement which is as old as the art of printing. It still carries a lot of weight. If it works "externally"—why should it not work "internally"?

MACHINE TOOL PRODUCTION LINES: Users of machine tools on mass production perennially urge that builders of machine tools apply mass production techniques to their activities in order to speed up deliveries—especially during times of stress such as now prevail. Ordinarily—but not inevitably—such recommendations are impractical. To no small degree this impracticability is due to insistence of too many users on too many deviations from standard design of the units in what otherwise might be standardized machines.

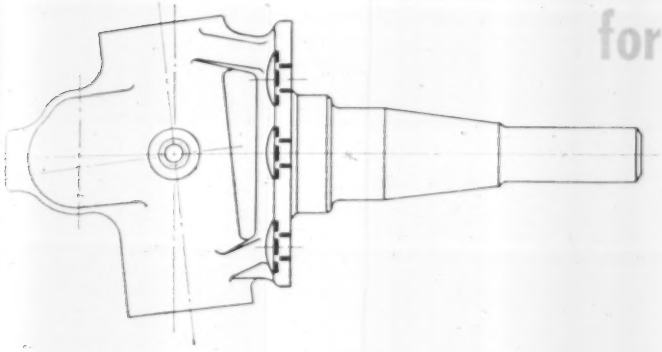
Now that machine tool designs are being frozen through stark necessity, if not by governmental ukase, there are signs of revival, and even of improvement upon, certain mass production principles which actually were put into operation during the hectic build-up days of the World War II production effort. This applies primarily to machines which often are sold in batteries, including automatic screw machines of small and medium size.

One of the highlights of my recent visit to Brown & Sharpe Mfg. Co., Providence, R. I., was a preview of a multiple track rolling production line already in operation on assembly of various sizes of single-spindle automatics. This will be supplemented by feeder lines which will feed in parts and subassemblies if and when conditions demand.

While conditions in this shop or any other machine shop do not warrant the use of power-driven chain conveyors which long have been featured in the automobile industry, this Brown & Sharpe system with its rolling dollies carrying ever-growing machine chassis, is fully suited to the task at hand. One interesting feature is the set of cross-rolling bridges which are moved into place when a machine in process comes to the point of crossing one of the established shop aisles. Thus the aisles remain normally open—the bridges being parked along the rear wall of the department when not in use.

One thing which contributes heavily to Brown & Sharpe's success in this direction is the principle which has been developed over the years of designing these automatics for final assembly by units. These units can be assembled and—in many cases tested—in separate and smaller departments. This makes it unnecessary for men to swarm over the machines at final assembly—a condition which slows everything down because everybody gets in one another's way and also on one another's nerves. Incidentally, steady nerves and infinite patience of skilled machine tool assemblers put these men in a class by themselves. Those characteristics always have—and always will—put this industry in a class by itself. No degree of mechanization can alter that.

Multiple Machining for Interchangeability



Side view of drop forged Studebaker steering knuckle showing relation of drilled, reamed and spot faced brake backing plate to spindle and body

On the setup described here two right hand and two left hand steering knuckles are drilled, two are spotfaced and two reamed—all at the same time

By ROBERT MAWSON

IN PLANTS manufacturng parts in large quantities it usually is necessary to perform identical operations on several machines at the same time. Under such conditions well designed tools insure interchangeable pieces, which are important not only in eliminating fitting at assembly but in facilitating repairs in the field.

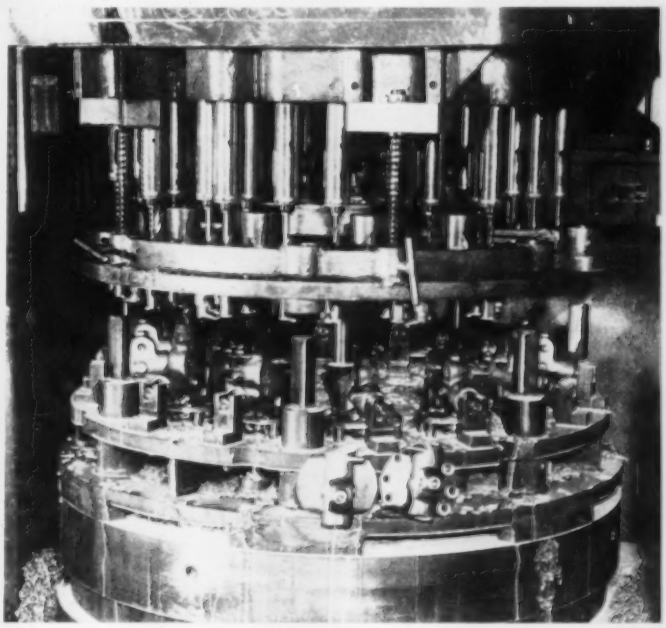
At Studebaker Corp., South Bend, Ind., there are many fine examples of multiple machining. The one described in this article involves secondary machining of steering knuckles after shanks of these steel drop forgings have been turned and the 1⅜-inch king pin hole, and tapered hole at right angle to it, finished to close limits.

Secondary operations indicated by the drawing, and end views of two parts in the photograph consists of drilling six 23/64-inch holes, reaming them to 0.385-inch and spot facing to ¾-inch. Setup for this work is shown in the photograph, right. A Baker drilling machine into which have been incorporated two 36-spindle Buhr drill heads is used.

On the machine table are mounted 14 fixtures designed to hold the steering knuckles. Their shanks are located by hardened steel bushings, one set being in the upper fixture plate, the other in the lower plate. Under surfaces of the flanges, which are brake backing plates, rest on hardened steel pins. A machine steel arbor is placed in the king pin hole of each piece. Small diameter outer ends of these arbors are set in machined slots in steel angles fastened on the upper plate of the fixture.

To perform the machining operation, one right hand and one left hand steering knuckle are located in the two front fixtures, these being nonmachining stations. The drill press table then indexes, bringing the parts to a station where six 23/64-inch holes are drilled in the flange. At the next index, these drilled pieces are brought to the station where they are spot faced to ¾-inch. Again the table indexes and the drilled holes are reamed to 0.385-0.390 inch. The final index brings the two steering knuckles back again to the nonmachining position where they are unloaded and a blank pair inserted, thus setting the stage for repetition of the cycle.

To review the situation, this machine embodies seven work stations and 14 spindles. With this arrangement, two right hand and two left hand steering knuckles are drilled; two are spotfaced and two are reamed—all at the same time. The machining phase of the cycle is just long enough to permit the operator to remove the two finished pieces and to position two blanks in the fixtures, between indexes. Average production with this setup is 200 pairs of steering knuckles per hour.



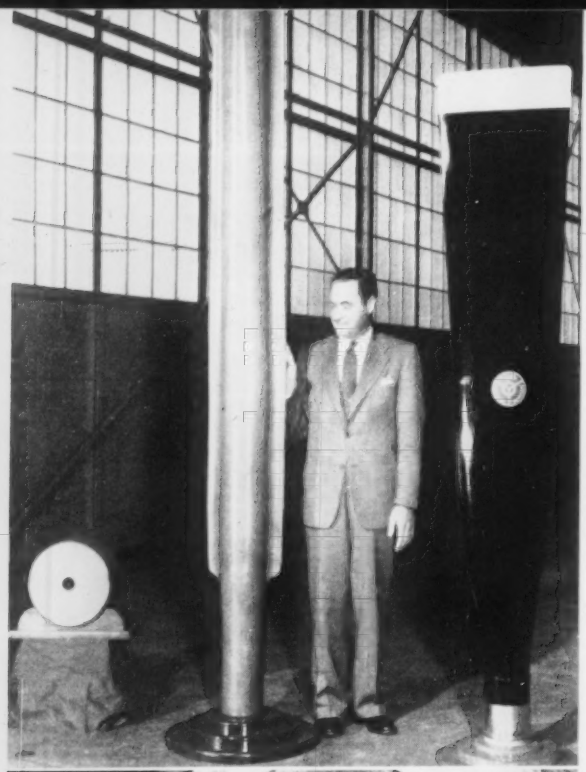
Baker drilling machine, with indexing table, work holding fixtures, holding jig disk and Buhr multiple spindle heads, arranged for two-at-a-time multiple drilling, reaming and counterboring of brake backing plates

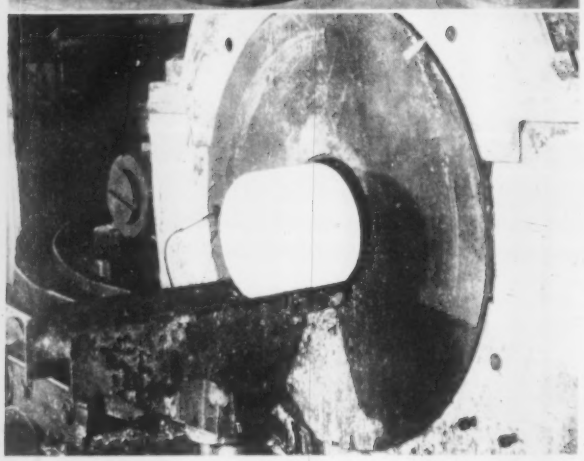
Aircraft Propeller Blades Hot Extruded Faster

ONE-PIECE hollow steel aircraft propeller blades are now being hot extruded by a process that will save strategic materials, skilled manpower, machining operations, manufacturing floor space and tools. Developed by Curtiss-Wright's Propeller Division in co-operation with the U. S. Air Force, the new technique reduces propeller manufacture to a series of three steps which can be accomplished in minutes. Previous methods required hours of handwork.

The extruded blade, Curtiss-Wright officials say, has progressed well beyond the experimental stage. Production for Air Force aircraft already has been initiated and plans are being made to supplement welded types now being manufactured with extruded blades as rapidly as facilities become available.

5500-Ton Squeeze — Perfected in less than two years, the technique consists of squeezing a white-hot 400-pound chrome-nickel-molybdenum steel billet through appropriate dies on a 5500-ton press to pro-



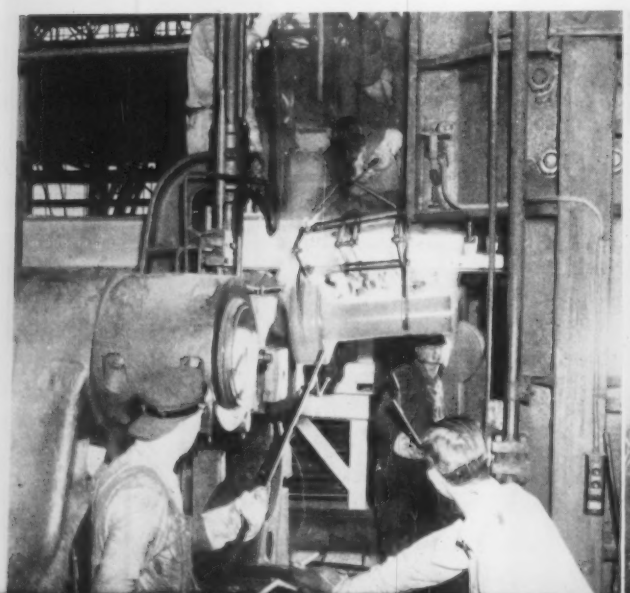


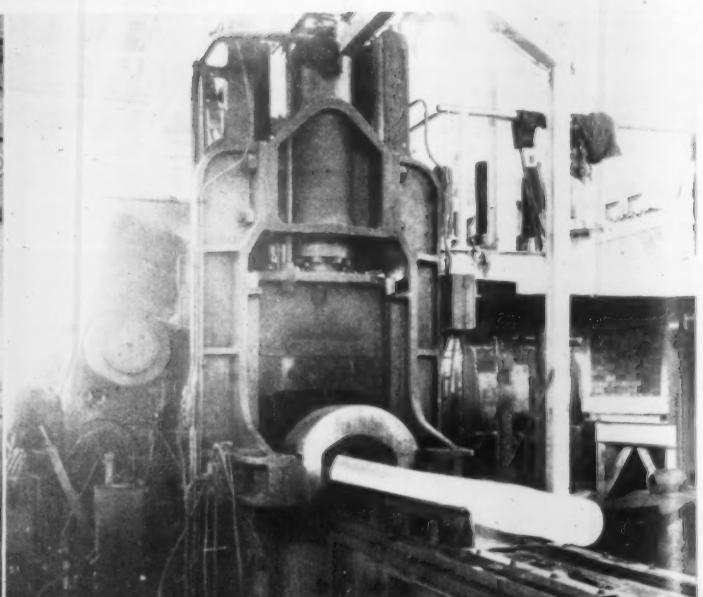
Top, left—One-piece tube (center), produced by heating and squeezing the 400-pound steel billet (left) through a series of dies, is transformed into the finished propeller blade (right) by flattening and forming

Left—Hot billet being inserted in the die container of the extrusion press for the first operation which forms the shank of the finished propeller blade

Below—Reheated after the first extrusion, the partially-formed steel billet is returned to the press for the second operation which expands and tapers the shank section in preparation for the final extrusion of the propeller blade tube

Below—Shank end first, a white-hot propeller blade tube emerges from the press on the third and final operation. The tube is transformed into a finished blade by flattening and forming in a die to give it the proper twist and turn





THINSTEEL *LOCKS UP MR. O. V.* (Production Enemy)

What a grand feeling it is to have smooth running production of cold-rolled strip steel parts—consistently getting maximum yield per ton, *particularly important now when every ton of steel must be stretched as far as possible.* That's the typical result in plants using CMP Thinsteel, precision cold-rolled strip in low carbon, high carbon (annealed or tempered) and stainless grades.

Where Thinsteel deliveries are possible under today's condtions you can have the same experience, too. It gives you control of OVERSIZE VARIATION in thickness, not uncommon in ordinary strip, and "locks out" for good this enemy of maximum parts per ton.

Now, CMP's problem is to get more Thinsteel production to match demand. We are meeting it with new mills and other increased facilities—and we are keeping the expansion program moving.

CMP THINSTEEL TRADE MARK

PRECISION COLD ROLLED C M P STRIP STEEL

the Cold Metal Products co.

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NEW YORK • CHICAGO • INDIANAPOLIS • DETROIT • ST. LOUIS • LOS ANGELES

WAREHOUSE STOCKS OF CMP THINSTEEL ARE AVAILABLE FROM:

THE COLD METAL PRODUCTS CO. of CALIFORNIA, 6600 McKinley Avenue, Los Angeles
Phone: PLeasant 3-1291

THE KENILWORTH STEEL CO., 750 Boulevard, Kenilworth, New Jersey
Phones: N. Y., COurtlandt 7-2427; N. J., UNionville 2-6900

PRECISION STEEL WAREHOUSE, INC., 4425 W. Kinzie, Chicago • Phone: COlumbus 1-2700

duce a 200-pound 10-foot propeller blade tube. This process, accomplished in three stages, contrasts with present time-consuming methods of welding together, brazing and forming two specially-processed flat plates, weighing 750 pounds before machining, to produce the same sized blade.

The rough propeller blade comes from the extrusion press in the form of a tapered-wall, seamless, round tube with "ears" or ridges running from shank to tip. In subsequent operations, the tube is flattened and shaped and the ears become the solid leading and trailing edges of the blade. Finishing operations are similar to those now used.

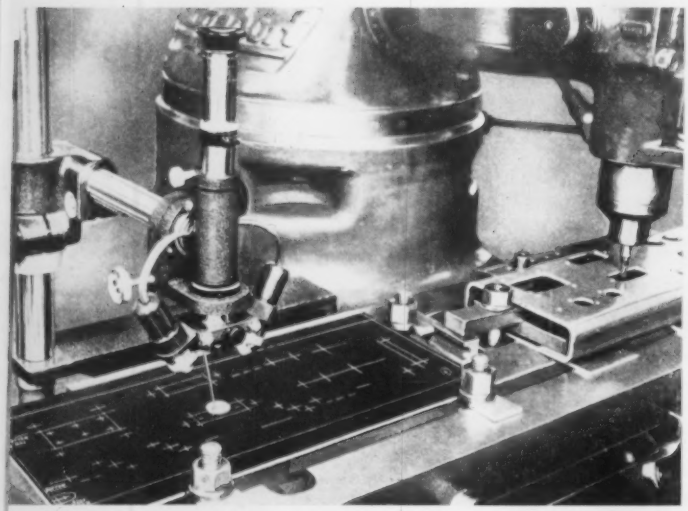
Blade Quality Better—The improved producibility of the extruded blade is accompanied by an improvement in blade quality and strength-weight ratio. The tough, homogeneous structure of the extruded steel provides greater resistance to the more severe stresses to which propellers for higher horsepower piston and turbo-prop engines, now in production or being designed, will be subjected.

Other items which can be extruded include gear struts, helicopter masts, helicopter or aircraft drive shafts, helicopter main rotor blade spars, gun barrels, tank parts, ship parts and members for prefabricated structures such as bridges and towers.

Duplicating Machining Simplified with Optical Follower

PRECISION hole spacing work on knee type milling machines can be performed with an optical follower duplicating instrument made by Boeckeler Instrument Co., Tucson, Ariz. Co-ordinate locations accurate to 0.0002-inch are given as the follower visually traces a template plate. The tracing finger used on conventional duplicating machines is replaced with a fully adjustable 32X microscope, converting a knee type milling machine into an efficient jig borer and eliminating many drilling jigs.

Template plates used are made with a height gage or other conventional layout methods, pattern being scribed on steel, aluminized glass or other suitable material. A sample job is shown in the accompanying illustration. Setup time for any hole duplication job is short and at the same time accuracy is high. Any number of duplication jobs can be performed after setup is completed and possibilities of human error are reduced. Operator has to have microscope crosshairs on the cross lines of the layout. He can't be off an entire turn of the lead screw and thus ruin the workpiece and the possibility of ruining workpieces through accumulated mathematical errors is eliminated. Such a mistake on complicated workpieces toward the end of an operation can prove costly in wasted labor and material.



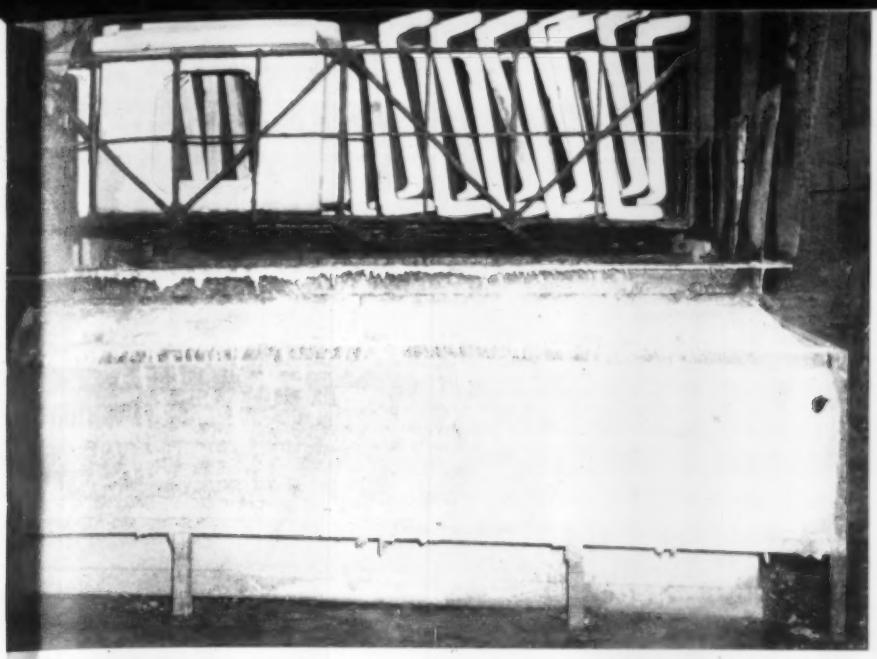
Since the operator uses a precision made template plate which has been checked and rechecked for mathematical accuracy, finished products are not dependent on his calculations. This means a company can use relatively unskilled personnel, consequently reducing direct labor cost and conserving specially skilled machinists for other critical operations.

Many simple and inexpensive dies can be made economically and accurately using the optical follower. A piece of tool steel bar as it comes from the warehouse is sawed off and shaped top and bottom only. A light surface grinder cut is then taken off the bottom. Die is made from the layout on a precision made template plate rather than from a layout on the workpiece itself. Holes are located with relationship to each other quickly and accurately and, with the operator following a precision layout on the template, the possibility of making calculation errors is eliminated. Shaping and squaring the sides of the die block are not necessary and there is no real need for finishing the bottom of the workpiece except to get a flat reference plane.

Cemented Carbide Tools Listed

A complete listing of cemented carbide tools is contained in catalog 51 offered by Kennametal Inc., Latrobe, Pa. Tools are segregated in sections of the catalog and graphically indexed for ready reference on the inside front cover.

Additional features include machining hints for various metals, tool wear analysis, grinding recommendations, description of Kennametal compositions and characteristics and design hints for best results. A section is devoted to Kentanium, the heat resistant titanium alloy giving some of the shapes produced and general characteristics of typical compositions. Illustrations and specifications of wear resistant parts such as balls, disks, grips, feed finger pads, bushings, extruded shapes, center and rolls give the potential user a complete picture of the parts available from the company.



One of two adjacent tanks which contain the hot caustic soda solution used for stripping enamel from steel. A load of defective parts is shown going in for a 2-hour immersion at 300° F. Note the brick muffle which goes around three sides of the tank and the gas burners entering at left

By DAN REEBEL
Associate Editor, STEEL

DE-ENAMELING Salvages Defective Ware

This new process assumes more than casual interest today as it results in conservation of material that heretofore was a complete loss to the fabricator

SUCCESSFUL removal of all types of enamels—including those resistant to acids—is being achieved in a 7-ton daily capacity pilot plant operated by New Process D-Enameling Corp., a subsidiary of Lawndale Enameling Co., Chicago.

This process saved a stove manufacturer many thousands of dollars by salvaging 6020 or 97 per cent of 6200 defective enameled stove tops which would have been scrapped and charged off as a complete loss. Scrap enameled parts have no market—generally the producer must pay to have them hauled away.

During an inspection of the pilot plant, Arthur Lander, president of both companies, explained that as a rule individual producers of enameled ware do not have enough de-enameling volume to warrant their own plant setup. However, by servicing many of the country's appliance manufacturers, Lander has been able to make it a profitable business. The company now is readying a new completely-conveyorized plant at Aurora, Ill., which will contain three buildings having 30,000 sq ft of floor space under roof. Pilot plant operations will be moved into the new plant during the next few months.

Solution Constituents—The de-enameling process, on which Lander holds patents, involves the mixing of 8 to 10 pounds of caustic soda per gallon of water, 1 to 1½ pounds of sodium silicafluoride, and ½ to 1 pound of a commercial wetting agent. This mixture is continually held at its boiling point of 300° F.

The solution will strip porcelain enamel from steel at the rate of 0.005-inch the first hour, 0.008-inch the second hour and 0.009-inch the third hour. The inventor revealed that this stripping rate continues fairly constant from thereon and applies to all types of enamel in use today. The only factor determining stripping time for any individual part, assuming the solution and temperature are at maximum operating points, is the coating thickness.

Heated tanks containing the caustic soda solution are controlled to maintain maximum efficiency by the use of test plates of known thickness. The two 2000-gallon tanks—designed by company engineers—are made of ½-inch mild steel plate and each heated by a brick muffle extending around its three sides. A gas burner with a blower enters at the end of each tank, circles it and leaves by a common exit to the stack.

Correct Temperature Important—Material to be de-enameled is left in the bath 2 hours during which time approximately 90 per cent of the enamel is stripped off. Their engineers found that by using just a 300° F temperature in the tank, none of the parts, even those fabricated of light 24-gage material, were warped any more than they were during their original enameling. All the enamel could be stripped off but practice has shown that the surface secured is not as good for re-enameling as with just a 90 per cent enamel removal.

After leaving the tanks, parts are manually hosed off with water. The surface then is exposed to a 30-pound silica sand spray blast which removes both sludge and the remaining 10 per cent of the original enamel. This renders the surface in a better condition for re-enameling than it possessed prior to the original enameling operation.

This blast also eliminates any remaining nickel flash that may have been used during the original enameling operation. Unless this is done, there is some possibility of contaminating the pickling tanks and even carrying-over into the ground coat dip tanks, either of which could cause a great deal of trouble.

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HOT METAL CARS AND MIXERS

• • • How to Extend Life of Refractory Linings

Variations in service life, often unnoticed, cause accelerated lining wear in vessels for handling molten pig iron more often than lack of uniformity in the refractories themselves. New theory on rate of wear indicates more hot metal can be handled per lining. This is the first of four articles

PART I

By R. P. HEUER
Vice President

and

C. E. GRIGSBY
Service Research Engineer

General Refractories Co.
Philadelphia

SEVERAL steel producers currently are testing lining materials for hot metal cars and mixers under service conditions so severe that refractories commonly used are not entirely satisfactory. This article discusses effect of service conditions and merits of various refractories in solving the problem of extending service life of cars and mixers under present strenuous operating conditions. One refractories manufacturer who makes brick of all the common types recommends unburned magnesite-chrome brick made by a patented process as the most economical lining material for mixers—and probably for hot metal cars also—where service conditions are extremely severe.

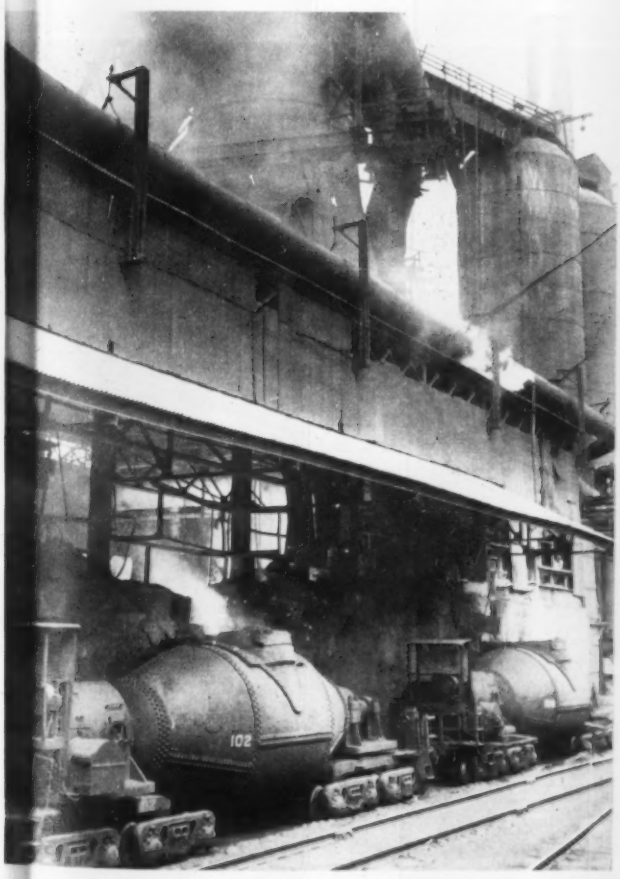


Fig. 1—Molten iron from the blast furnace is being charged into a 196-ton submarine-type hot metal car

Approximately 90 per cent of the pig iron used in all steelmaking furnaces in this country is charged in hot metal form. The metal is kept molten and as hot as possible in special ladles called mixers or hot metal cars, from the time it leaves the blast furnaces until it is poured into the steel refining furnaces. Both mixers and hot metal cars save tremendous quantities of heat and fuel—increasing furnace production and decreasing the cost of steel. These unheralded, prosaic, "work-horse", hot metal containers —like giant thermos bottles—play a role that deserves as much publicity as any coke oven, or any of the glamorous-looking blast furnaces, open-hearth furnaces, electric furnaces, or bessemer converters which they serve.

Effect of Service Conditions—Lining life of a given vessel often varies greatly under service conditions which the operator believes to be unchanged. Contrary to some opinions, high grade brick of a given brand or type rarely vary in quality enough to account for the differences in service frequently observed. On the other hand, small unrecognized increases in ladle temperature may make marked increases in the fluidity of slags in certain critical temperature ranges —thus greatly accelerating the rate at which partially neutralized slag is removed from the brick surface. When this happens, the brick surface is repeatedly exposed to the vicious attack of fresh, highly-corrosive slag, with the result that rate of lining wear is increased by an almost unbelievable amount. Furthermore, small unnoticed differences in the concentration of reducing gases in the ladle atmosphere, may make a tremendous increase in slag fluidity.

A few unnoticed, slightly hotter casts from the blast furnace, with or without a reducing atmosphere, may do far more damage to linings of cars and mixers—especially if they are raised above the critical temperature at which the rate of slag corrosion increases rapidly—than many times that number of

casts at but slightly lower temperatures. Conversely, if the lining is cooled too much, brick contraction permits iron and slag to enter the joints, causing the brick to shrink further, and accelerating metal erosion and slag corrosion by exposing the brick to metal and slag on five faces.

Thus, variations in lining life are usually due to unintentional and unnoticed changes in severity of service conditions, rather than to variation in quality of refractories of a given brand. Even when these facts are pointed out, many operators still believe that conditions were identical to the usual practice, and that quality of refractories varies widely. The result is that refractories of perfectly satisfactory quality are often blamed for poor life, when the real cause of the trouble is variation in service conditions.

Effect of Daily Tonnage—There is a widely-held opinion that an increase in tons of iron handled per day, by hot metal cars and mixers, invariably decreases length of service or tons per lining, or both. Eight comparisons of data for 16 so-called "campaigns" on five hot metal mixers, of five different sizes, from five plants, using four brands of brick, comprising three different types of refractories, indicated that this opinion was incorrect for the cases examined. In every comparison, increase in tons of iron put through the mixer per day, increased tonnage per lining and, in five of the eight cases, also increased the number of operating days per campaign. The mixers studied included 250, 600, 800, 1200, and 1300-ton vessels.

Reported increase in average tons per day varied from 11.2 to 248 per cent—average 49.0 per cent— for the eight comparisons; increase in tons per campaign ranged from 4.5 to 99.9 per cent—average 42.3 per cent; and the change in the number of operating days per campaign varied from 72 per cent increase to 38.4 per cent decrease—average 10.9 per cent increase.

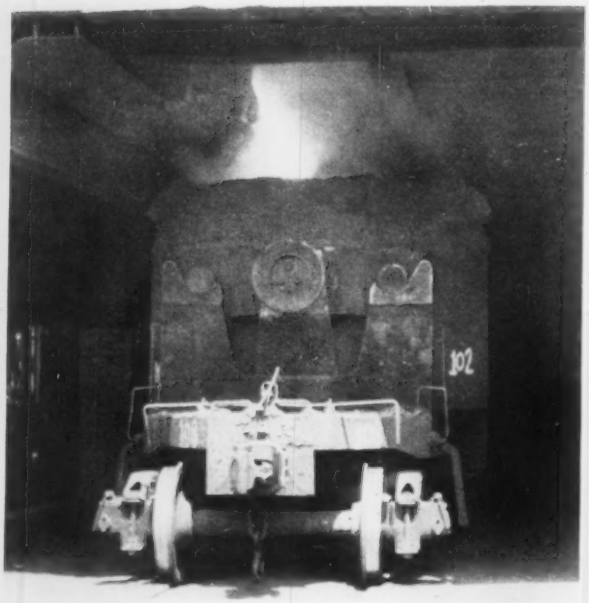


Fig. 2—Hot metal being poured into a semiclosed-type 75-ton hot metal car from a blast furnace runner

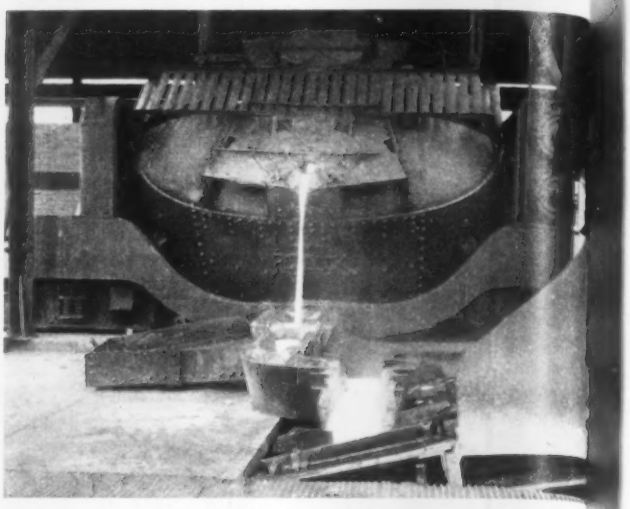


Fig. 3—Special 125-ton self-dumping hot metal car pouring iron into a pig casting machine

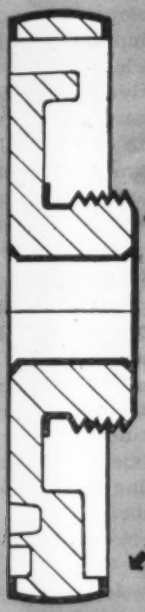
Lining materials included high duty fireclay brick laid with fire clay mortar; unburned magnesite-chrome brick laid in chrome-magnesite mortar; and hi-fired super duty fireclay brick—no data on mortar.

New Theory on Wearing Rate—Because of the limited extent of these data, and the fact that data of this type are dependable only when comparing "campaigns" which have worn the lining to about the same extent— (as measured by the amount of repair needed at the end of the run)—no definite conclusions can be drawn from the mixers studied. It is believed, however, that the results may be more than coincidence, and that examination of the extensive data available to operators of hot metal cars and mixers at steel plants might indicate that these results are typical of the effect of change of operating rate for both types of vessel.

On that assumption, a new theory has been evolved, viz: it seems reasonable to expect that, in most cases, an increase in tons of metal put through a ladle per day may result in an increase in tonnage per lining, and that, in many cases, operating days per campaign will also increase. This is believed to be true, despite the fact that increased tonnage increases lining temperature and that there is a critical temperature for each combination of slag and refractory above which the slag's fluidity—and, hence, the rate of slag corrosion—may increase tremendously with a few degrees rise in temperature.

To illustrate the principle involved, let us suppose that a ladle were filled completely, then emptied at once, and the process repeated for 24 hours. Even in cases where the critical temperature of both lining and slag was exceeded, the tonnage put through would be so tremendous that lining wear, per ton of metal, would probably be very small. This is expected because the metal would not be in the ladle long enough to oxidize much iron and manganese per ton of metal, and a considerable percentage of the small amount of oxides formed might be removed with the metal, while the little that remained in the ladle would not be in contact with the lining long enough

You Can STEP UP Production



ALL PRECISION MACHINING ON THIS FLYWHEEL, AS INDICATED BY THE HEAVY LINES IN THE DRAWING,

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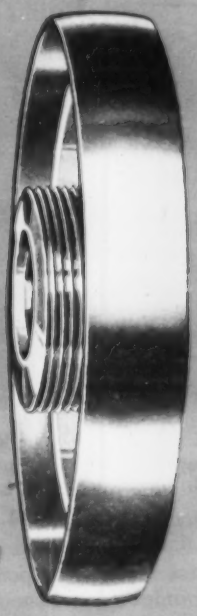

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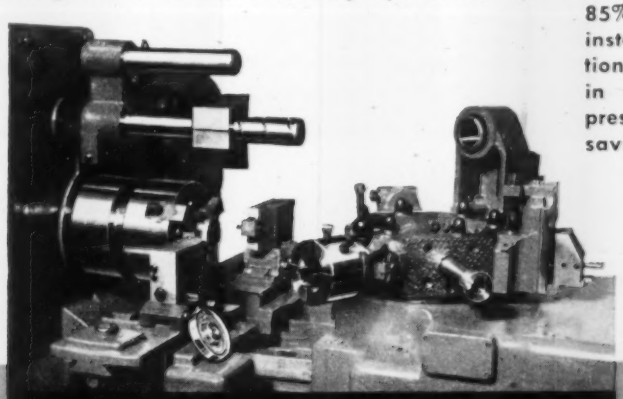

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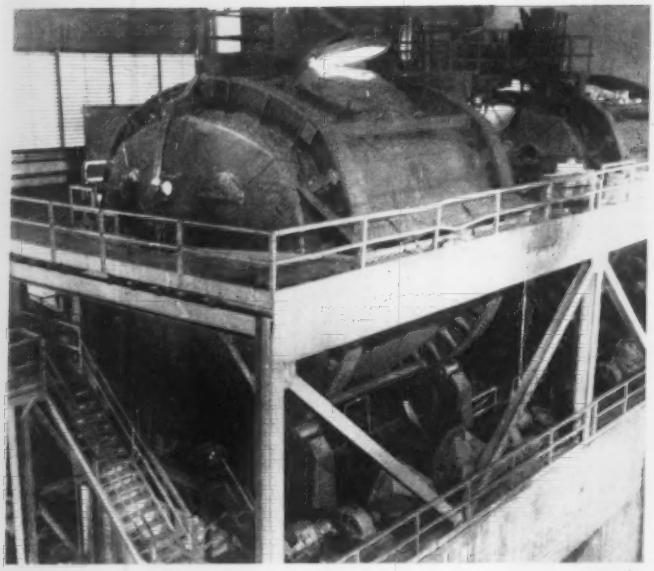


Fig. 4—Two 800-ton hot metal mixers under fire in a large modern steel plant. They are normally fired with coke oven gas, but are also equipped for oil firing if necessary

to cause much wear per ton of metal. Thus, tons per lining might increase materially, even though the length of campaign might be reduced. If the critical temperature were not exceeded, both tons per lining and length of service would likely increase.

Conversely, if the container were filled with metal and allowed to stand 24 hours, without any metal being poured out, there would be plenty of time to oxidize large amounts of iron and manganese, and these oxides would have ample time to destroy the refractories. Therefore, depending upon the type of lining and the service conditions, rate of lining wear might be fairly high; tonnage put through would be zero; and wear per ton of metal would be infinitely great. Actual operating conditions would fall somewhere between these two extreme hypothetical cases, and results would be somewhere between these limits.

Critical Temperature Important—For the high iron oxide slags found in cars and mixers, the critical temperature—above which the rate of slag corrosion inceases rapidly—usually increases with the alumina content of alumina-silica refractories, and with increase in magnesia in basic refractories. Whether this critical temperature is exceeded in service or not depends upon numerous factors—most important of which are the original operating temperature; percentage increase in operating rate; composition of the slag; and whether the atmosphere above the metal is oxidizing or reducing. In general, the higher the alumina or magnesia of the refractories, and the lower the operating temperature, the greater the permissible increase in tons of iron put through the vessel per day without danger of decrease in number of operating days per campaign—due to exceeding the critical temperature.

Obviously, if the original operating temperature is near the critical temperature for the lining material, a comparatively slight increase in operating rate may put the lining above the critical level. If that happens, rate of lining wear will be increased and length of service decreased. However, if the operating rate is increased sufficiently, tons of metal per lining often increase, despite a reduction in operating days. This occurred with two different types of brick in three of the eight comparisons noted above.

If the original operating temperature is far enough below the critical temperature level for the refractory and slag, even the comparatively large increase in temperature due to a great increase in tons per day, will probably be insufficient to bring the lining temperature above the critical level. Thus rate of wear per day would remain substantially unchanged, and tons per lining might be expected to increase almost in proportion to the increase in tons per day.

Conditions Determine Results—A given percentage increase in tonnage of metal put through a hot metal car or mixer per day might be found to increase the length of service in some cases; decrease it in others; and make little or no change in still others—depending upon the particular combination of the numerous variables noted above. Regardless of the effect on length of service, most hot metal cars and mixers which are not already operating at or above the optimum rate for the lining material in use, under the conditions to which it is subjected, will probably give increased tonnage per lining if the operating rate is increased—thus reducing refractories cost per ton of metal. If the critical temperature of siliceous materials, high-duty fireclay or super-duty firebrick is being exceeded, longer life and reduced cost per ton of metal will probably result from the use of high alumina materials—especially those of diaspore or bauxite base—or unburned magnesite-chrome refractories in the slag line and below.

It seems probable that the optimum percentage of rated capacity for various mixers or cars is different, even with the same type of lining. Because of the numerous factors which affect the rate of wear, it is obvious that each individual ladle presents a unique problem. While general principles can be used as a guide in selecting the type of lining and the most desirable operating rate, most economical lining and rate of operation for any given vessel, type and temperature of iron, can be determined only by service tests.

Regardless of lining type and daily tonnage of iron, it has been repeatedly proved that thermostatic control of mixer roof temperature at 2150-2250° F is a highly effective method making a marked increase in lining life—both in tons and in number of operating days. In like manner, material reduction of temperature of iron and slag in hot metal cars of all types will—other things being equal—usually increase lining life also.

Erosion Resistance Ideas

Step-by-step procedure to be followed in applying corrosion-resistant cement over steel gridwork is contained in an illustrated bulletin issued by Pennsylvania Salt Mfg. Co., Philadelphia. This method offers high resistance to erosion and successful installations have been made in refineries for lining points of attack in fluid catalytic cracking units.

Multiple Slide Press Easy to Set Up

TO THE uninitiated, tooling up for production of three dimensional formed parts on a multiple slide press might appear to be a complicated undertaking. W. P. Powers, secretary, and Al Melnick, chief tool engineer, U. S. Tool Co. Inc., Ampere, N. J., at the recent annual meeting, American Society of Tool Engineers, analyzed the design and action of this type of machine in a manner which reveals it to be a co-ordinated assembly of simple units which are relatively simple to set up.

The multiple-slide press is basically a series of presses through which the part passes to a forming position. Progressive operations are done as the piece moves through the dies and the stock is usually in continuous form when it leaves the last die position. At this point, the piece is ordinarily detached from the strip and the forming operation takes place about a vertical post. At this point there is much opportunity to display tool engineering ingenuity. It is possible, and common practice, to do preliminary forming at the "stock line" level and then, by stripper action, to move the piece to the next level below where it is again formed by "lower level" tools which are built as part of the upper level tools.

Four Slides Actuate

The forming tools are actuated by four slides: Front, rear, left and right. Double slides are sometimes provided to accomplish certain results. When one realizes that four opportunities are afforded to form the piece at perhaps two or three levels, it is clear that the tools for *each* operation will be comparatively simple. This greatly simplifies tool changes after the job is set up. The operator removes and corrects only the tool in question. Because the forming operations are done successively and not simultaneously the material is not subjected to excessive strain. A typical example of this is a simple series of right angle bends to form a closed square. Because of the versatility of this type of machine, a wide variety of parts can be produced.

The machine typically consists of a pedestal upon which a bed is mounted. The bed is surrounded by a continuous shaft which receives its power through a suitable variable-speed drive and clutch mechanism. On the bed are mounted the die heads (horizontal presses) and the various forming tools, all of which are driven from the surrounding shaft.

Stock Fed Edgewise

Coiled stock is mounted on a reel (usually power driven with loop control) and fed edgewise into the machine. The stock enters the machine and passes through a stock straightener to the feed, thence the check, and then on through the die positions. The stock is usually maintained in continuous form to this point, the piece being detached at the "cut-off" position located just beyond the dies as the piece passes from the dies to the forming positon.

The feed is really a stock-gripping vise which is arranged to move longitudinally bringing forward the exact amount of stock desired with every revolution of the shaft. The feed block is driven through a simple lever system from an adjustable eccentric geared to the shaft. The approximate feed length is obtained by adjusting the throw of the eccentric, but the *exact* length of feed is obtained by setting stops which limit the travel of the feed block.

At the end of the forward stroke of the feed the feed releases the stock, and a cam-operated check holds the stock until the die operations are complete and until the next forward feed stroke begins. The stock is now at the die positions.

Cams Timed

Unlike the power press, with its fixed stroke, the cams on multiple-slide machines can have any desired shape and can also be timed. Thus light pressures can be provided through relatively great strokes, or heavy pressures through relatively short strokes. A cam is mechanically a wedge added to a circle, the wedge being driven tangentially under the cam roller by the torque of the shaft. Naturally, therefore, a long slender wedge (slow rise on the cam) will give greater lift for a given available torque definite horsepower at fixed speed. By throwing the instantaneous torque requirements out of time, or doing the operations progressively, smooth operation is obtained.

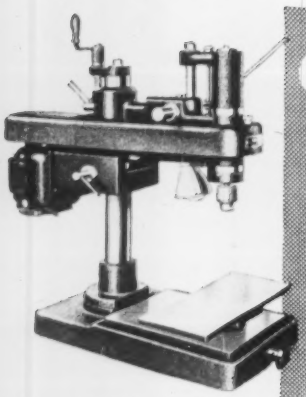
The die heads do not work at exactly the same instant. In other words, the instant of pressure of the first ram does not coincide with the instant of pressure of the second ram. The cams operating the rams of the die heads are located on the flat of the shaft by a wedge system. By changing the angle of the wedge which keys the cam to the shaft, the desired angular displacement can be obtained.

The forming position follows immediately after the die position. Four forming slides operate from the surrounding shaft. On these slides are mounted the forming tools which operate around a vertical forming post. The designer arranges the sequence of forming operations as desired. There is considerable possibility here for the tool engineer to accomplish complicated forming with a relatively simple tool setup.

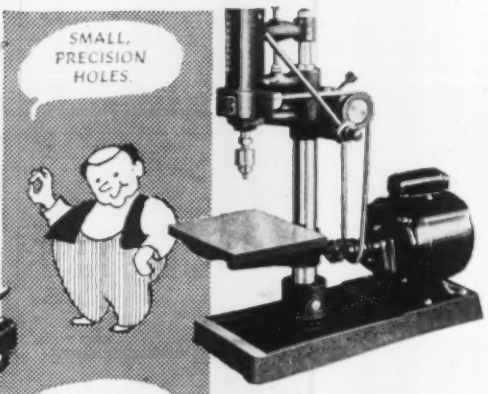
Toggle Press Needed

Where extreme pressures are required the designing engineer will require a toggle press. This unit delivers extreme pressure through a relatively short stroke. This pressure is obtained by a cam-operated toggle which is actuated from the main shaft. The design is usually arranged so that the toggle movement is very slight and the toggle is at all times in almost perfect alignment.

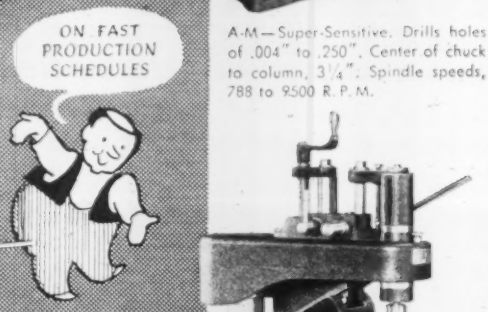
In some cases the designing engineer will find he requires a tool movement against the ram. He may wish to pre-form against the ram, or shear and form. Frequently the burrs which result from pierced holes are specified to be on a certain side of the material. This condition may call for piercing against the ram. A rear auxiliary slide can be used.

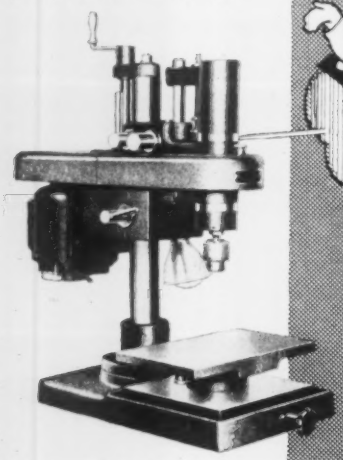


Maximus — Super-Sensitive. Drills holes of .004" to 5/16". Center of chuck to column, 8". Spindle speeds, 750 to 8750 R.P.M.

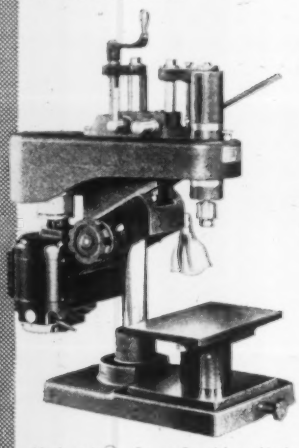


A-M—Super-Sensitive. Drills holes of .004" to .250". Center of chuck to column, 3 1/4". Spindle speeds, 788 to 9500 R.P.M.



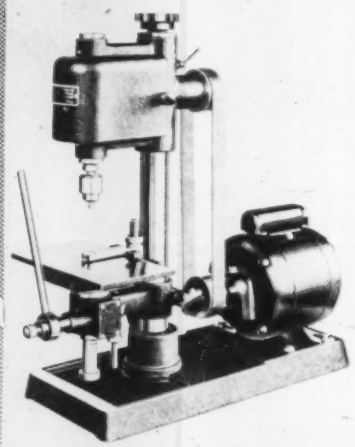


Maxi-Jr. — Super-Sensitive. Drills holes of .004" to 5/16". Center of chuck to column, 5". Spindle speeds, 750 to 8750 R. P. M. (Special drive for higher speeds available.)



Varimatic©—Super-Sensitive, Variable Speed. Drills holes of .004" to 5/16". Center of chuck to column, 5". Spindle speeds selective between 840 and 9300 R.P.M.

FOUR DRILLS AND A TAPPER



Hamilton Super-Sensitive Tapper. Taps from the smallest and finest to 10-32 inclusive. Center of chuck to column, 3 1/4". Spindle speeds, 1200 to 2600 R.P.M.

These tools combine split-hair precision, and stamina far beyond the average user's requirements, at no price premium. For complete information, including specifications and prices, write for our Bulletin V-471.

THE Hamilton TOOL COMPANY

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Work Performed at 13 Stations

One hundred cylinder blocks per hour are drilled, tapped, spot-faced and reamed on a new machine designed and built by the Cross Co., Detroit, Mich. The new machine is made up of 13 stations with parts automatically moving from station to station. Only one unskilled operator is required.

Operations include drilling, chamfering and tapping holes in the top and bottom; chamfering the cylinder bores, top and bottom; drilling oil holes from crank bearings to oil gallery; drilling, rough boring, semi-finish boring and spot-facing the distributor shaft hole; and drilling, chamfering, and reaming the dipstick hole. Several unique features are also incorporated in the new machine.

Cleaning unit situated at station 11 vibrates and rotates the cylinder block at 360 degrees to remove all chips from the holes before inspection and tapping. At station 12, an automatic inspection unit stops the machine if the holes are not drilled to the proper depth for tapping. A special coolant system is used to flush the taps. An oscillating type chip conveyor that is built in, removes all chips.

Hydraulic and electrical installations are to J. I. C. standards. Stranded wires are used throughout. The machine is automatically lubricated with each cycle. Other features include hardened and ground ways and the use of standard Cross units to facilitate maintenance, reduce downtime and provide flexibility for part design changes.

Quaker Plan Conserves Rubber

Aware of the problems now facing industry in conserving rubber and increasing production with present equipment, the Quaker Rubber Corp., division of the H. K. Porter Co. Inc., Philadelphia, has developed a conservation maintenance plan. Included in Quaker's program are a handbook, wall charts, and monthly bulletins. This data contains hundreds of illustrations and suggestions on how to select, install and maintain conveyor belting, flat transmission belting, V-belts, hose and packing.

By adopting the plan, plants will be able to prolong the life of industrial rubber products. Therefore, they will be able to save hundreds of dollars by keeping equipment running with the minimum time out for repairs and replacement. At the same time these plants will be helping to conserve vital rubber. In announcing

...carries a tremendous load

No other anti-friction bearing of comparable size can equal the radial capacity of Torrington Needle Bearings. A full complement of rollers distributes the load over the largest possible bearing contact surface while holding radial cross-section to a minimum.

Our engineers have solved many high-load, limited space problems with Torrington Needle Bearings. Why not let us help you with your application?

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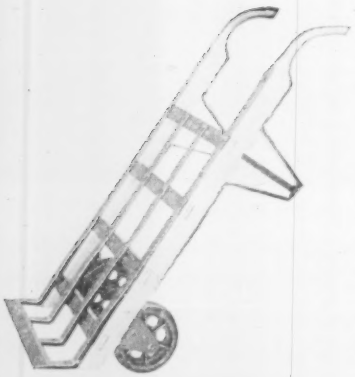
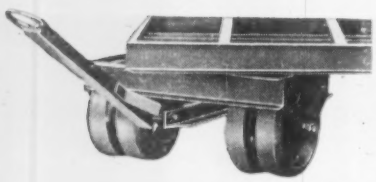
TORRINGTON *NEEDLE* BEARINGS

NEEDLE • SPHERICAL ROLLER • TAPERED ROLLER • STRAIGHT ROLLER • BALL • NEEDLE ROLLERS



Trucks and Trailers



up to 50 ton capacity

Built with 80 years of skill by pioneers in the industry. Over a hundred standard two, four, and fifth wheel trucks and trailers. Special units designed and built to your specification. Complete engineering service.

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THE KILBOURNE & JACOBS MFG. CO.

792 Congress St., Columbus 16, O.

the plan, J. R. Keach, vice president and general manager, said: "Within the next few months we expect this rubber-saving plan to be enthusiastically endorsed by leading industrial plants from coast to coast. It's the practical approach for "making the most out of rubber products on hand."

Magnetic Conveying Explained

New principles in conveying skelp, plate, sheet, rod, bar, pipe and shapes through the installation of magnetic conveyor elements are illustrated and explained in bulletin No. 553, prepared by the Eriez Mfg. Co., Erie, Pa. Conveyor element magnets have many varied applications. A few are: 1. In pipe roll mills—handling skelp to the roller leveler, sizing shear, charging furnace or in the loop of continuous mills. 2. In sheet and plate mills—conveying to and from roller levelers, shears, galvanizing pots, etc. 3. In stamping plants—feeding steel sheet or strip to punch presses, shears, washers, etc. 4. In steel and iron warehouses—applications for efficient conveying of iron and steel sheet, pipe, rod, bars, etc.

Several typical installations are described thoroughly in the bulletin. These include the use of the magnetic conveyor element on an existing conveyor where a single magnetic roll is sufficient, and also where relatively narrow contour rolls of moderate magnetic traction are desirable. Types available, method of selection, and cost cutting characteristics are also included.

Steel Castings Take Big Loads

Supporting more than 36 million pounds of dead weight in the towering new Narrows bridge at Tacoma, Wash., 366 comparatively small and compact alloy steel castings are fulfilling a key engineering function. The $14 million bridge is the third longest suspension span in the world. More than 16,000 tons of structural steel alone were used in the 29-month job of erecting the mile-long structure. Twin towers rising 502 feet above the waters of Puget sound carry the 20¼-inch diameter cables that support the four-lane roadway. Alloy steel cable band castings were specified to carry the immense load.

Comprising a relatively light tonnage of 329,400 pounds in comparison to overall weight, the 366 cable band castings are employed to suspend the bridge bed and roadway from the massive suspension cables. Produced to special order by the Atlas Foundry & Machine Co., Tacoma, the cast steel cable bands vary

Looking for specialties

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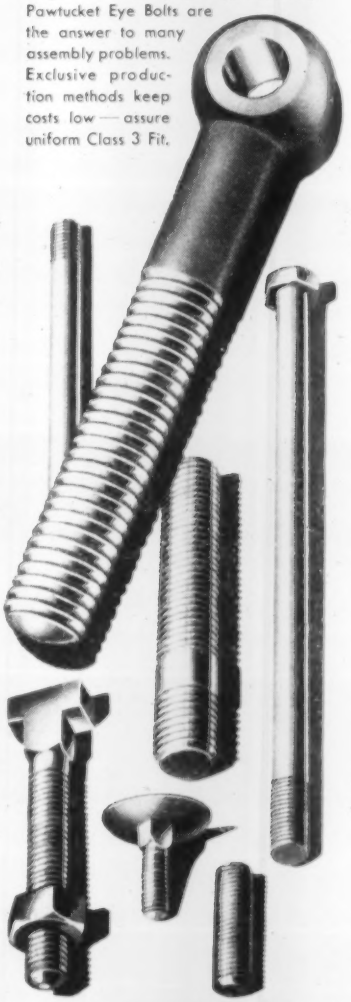
Accurately made in sizes ¼" and larger, or to your specifications, Pawtucket Eye Bolts are the answer to many assembly problems. Exclusive production methods keep costs low—assure uniform Class 3 Fit.



BETTER BOLTS SINCE 1882

Use Headed and Threaded Fasteners for Economy and Reliability

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THE PLACE TO SOLVE YOUR BOLT PROBLEMS

T.M. REG.

in weight from 400 to 2400 pounds each, average weight being about 900 pounds per band. Average length of the cable bands was 34 inches, the castings being strategically placed along the elliptical expanses of the twin suspension cables to sustain the major calculated loads involved. All cast in halves, the band castings subsequently were machined in the bore and face, and a caulking groove was machined in each end.

Electronic Assembly Eased

Grant Pulley & Hardware Co., Flushing, L. I., N. Y., is prepared to offer manufacturers of electronic equipment a new development in the electronic field. Grant electronic slides can be applied to any device where access to parts or motion of equipment is desired. Closely fitted slide parts assure minimum of play. Locking device holds moved unit when fully extended, permitting quick access to operating parts.

Quadrant for pivot support and tilting provision is equipped with simple mechanism for servicing. Lever operated, slide allows for unit's movement to open and closed positions.

The construction is such that extended, locked or pivoted units can be kept in operation while servicing is done. They are applicable to chassis, racks, consoles, stationary or mobile units where need for motion of component unit is required.

Brass Fittings Standardized

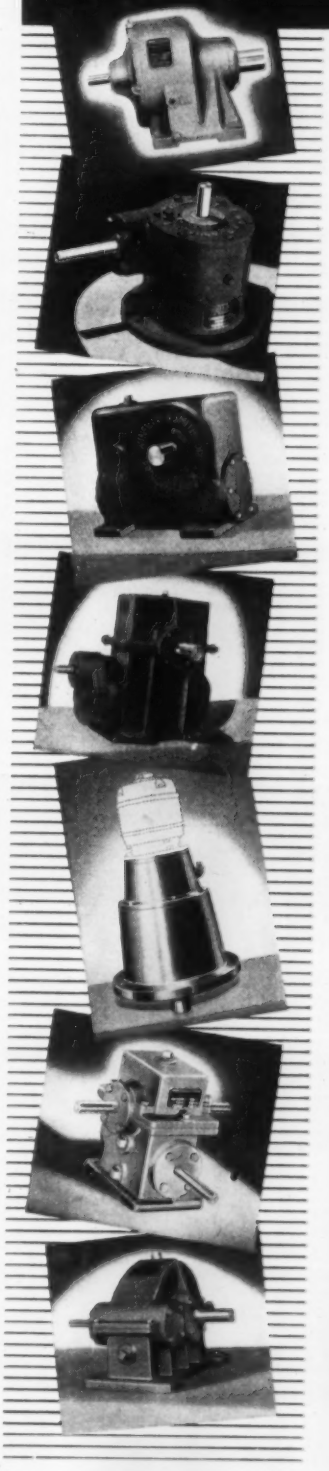
Parker Appliance Co., announces that a single new style of brass flared tube fitting will replace four brass fitting types heretofore manufactured, in a four-month changeover program beginning July 1. The new fitting will be a counterpart in brass of the Parker Triple-lok J. I. C. standard steel fitting, with a 37 degree flare angle, dryseal pipe threads, and the three-piece design. The brass fitting efficiently replaces the Parker two-piece and three-piece fittings in both single and XX weights, as the Triple-lok design accommodates the full range of standard tubing wall thicknesses.

High volume production will permit the pricing of the superior new fitting at the same level as the least expensive of the four styles previously stocked. The availability of a single-style brass fitting which satisfies all needs and codes makes possible design and application economies in the user's plant, through standardization.

Further, inventories spread over four lines can now be concentrated

Shorten the interval between design and assembly line with

WINSMITH Standardization



Huge military and domestic needs place increased emphasis on design speed-ups and production simplification.

This calls for maximum standardization. One way to achieve it, where power transmission problems are involved, is with Winsmith speed reducers. For, no matter how individual the purpose, how specialized the function, how complex the design and production problems, most requirements can be served with standardized Winsmith reducers.

With industry's widest range of standard designs and sizes from fractional to 85 H.P., Winsmith can meet your normal and special demands . . . can help you shorten the interval between machine design and assembly line.

And a Winsmith power transmission engineer in your locality is available for consultation.

DESCRIPTIVE FOLDER, "Save through Standardization," will aid in your selection. Write.

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14 Eaton St.

Springville (Erie County), N. Y.

50th Anniversary

WINSMITH SPEED REDUCERS

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RESEARCH, DEVELOPMENT AND TESTING

CO-ORDINATED ENGINEERING DESIGN

Life-Line starter

PAIRED FOR PRODUCTION

Life-Line motor

EXTRAS like these assure long-range performance

You get more than a motor and a starter when you install these Life-Lines. You get complete design, engineering and service every step of the way.

CO-ORDINATED ENGINEERING DESIGN makes sure that Life-Line motors and Life-Linestarters give long-range performance. They're made together to work together.

RESEARCH, DEVELOPMENT AND TESTING in Westinghouse laboratories result in such features as:

Steel frame
Pre-lubricated bearings... in Life-Line motors
"De-ion"® arc quenchers
Bimetallic relays . . . in Life-Linestarters®

APPLICATION ASSISTANCE to help you select the right motor and control.

Application engineers for your daily problems
Consulting engineers for special design problems
Field offices in 123 locations for all your service requirements

All at your service without obligation.

UNIFIED RESPONSIBILITY . . . for operation of the motors and protective controls.

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MAINTENANCE SERVICE is all-inclusive and nationwide.

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More details? Ask your Westinghouse representative. Call him today. Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-21637

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Let our **ENGINEERING DEPARTMENT** Supply the answer to your **PRODUCTION ASSEMBLY PROBLEM**

Our thoroughly trained engineers are ready to design equipment for your individual needs . . . No package goods . . . Whatever we furnish you will be planned for your particular purpose . . . And our 25 years of specialized experience qualifies us to do your job successfully . . . Thousands of manufacturers have profited immeasurably through greatly stepped-up production as a result of our service. You, too, can benefit likewise by the use of D.P.S. power-driven machines. Get further details. Mail the coupon today . . . Also send sample assembly for production estimate.

AVAIL YOURSELF OF OUR UP-TO-DATE EXPERIMENTAL LABORATORY EQUIPPED TO SOLVE THE "IMPOSSIBLE"!

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The SOLUTION may be tied in with one of our FOUR MAJOR PRODUCTS!

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1926 Our 25th ANNIVERSARY 1951

DETROIT POWER SCREWDRIVER CO.

in the one design, which means better stocks and service for distributors and lower inventory costs within the plant.

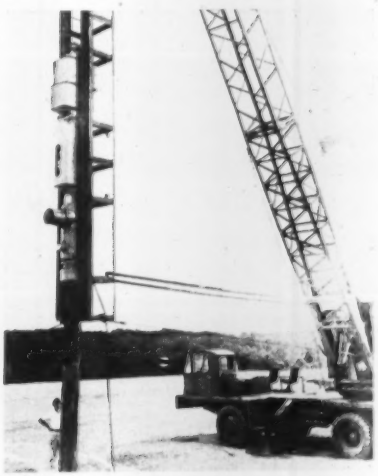
The change-over schedule contemplates that the triple brass fitting in standard weight will be superseded in the ⅛ to 5/16-inch size range on shipments beginning July 1; the ⅜-inch size Aug. 1; the ½-inch size on Sept. 1; and the ⅝, ¾ and 1-inch sizes on Oct. 1. Triple-XX weight and both weights of two-piece fittings will likewise be superseded by the new brass Triple-lok style fitting on Oct. 1.

Cleaning Problems Analyzed

Application of specially designed airless blast equipment to 39 production cleaning problems, such as those encountered with automotive and railroad equipment, tubing, soil pipe and steel drums is described and illustrated in a new 28-page brochure published by the American Wheelabrator & Equipment Corp. The problems are taken from practically every major industry in both the metalproducing and the metalworking field.

Firms confronted with cleaning and finishing problems, wherein the nature of the product or the produc-

Pile Hammer Powered by Diesel



PRESSURE is maintained on this self contained diesel pile hammer without auxiliary equipment such as steam boilers or air compressors. It is 15 feet 6 inches long, has a 20-inch diameter and weighs 11,000 pounds. Driving energy is delivered at the rate of 16,000 foot pounds per stroke and the unit is capable of 84 strokes per minute. Hammer fits in standard 20-inch leads and can be handled by mobile crane. Syntron Co., Homer City, Pa., makes the unit, a development sponsored by the Navy

tion rate dictates the use of blasting equipment which employs special work-handling mechanism, will find this booklet highly informative.

Illustrated with drawings and installation photographs, the catalog gives some production figures in specific cases. For a copy of this booklet, write to American Wheelabrator & Equipment Corp., 555 S. Byrkit St., Mishawaka, Ind., and ask for catalog No. 724.

Corrosion Resistance Computed

A pocket-sized computer that quickly and accurately tells the proper nonferrous or stainless steel alloys to use for 142 corrosive situations is offered by H. M. Harper Co. Computer is printed in three colors on heavy, long-lasting paper board. It operates simply, like a slide rule. The inner member is moved to line up the corrosive agent with a large arrow. A window then rates 13 nonferrous and stainless steel alloys as excellent, good, fair or not good for this agent.

This computer is helpful today as it assists in the choice of substitute materials when the nonferrous or stainless steel alloy usually used is unavailable. It will be mailed free to executives, engineers, metallurgists and others interested in fastenings. Write H. M. Harper Co., 8200 Lehigh Ave., Morton Grove, Ill.

Two Rust Furnaces Go to Italy

Design and complete engineering services for two slab reheating furnaces to serve a hot strip mill of Societa Italiana Acciaierie di Cornigliano at Genoa, Italy, are being furnished by the Rust Furnace Co., Pittsburgh. Both units will be continuous slab reheating furnaces of the pusher type, modern in every respect, with a capacity of 65 metric tons per hour each.

Rust will also furnish recuperators, and combustion and control equipment for the furnaces, which will be zone-controlled and triple-fired with either fuel oil or a mixture of blast furnace and coke oven gas.

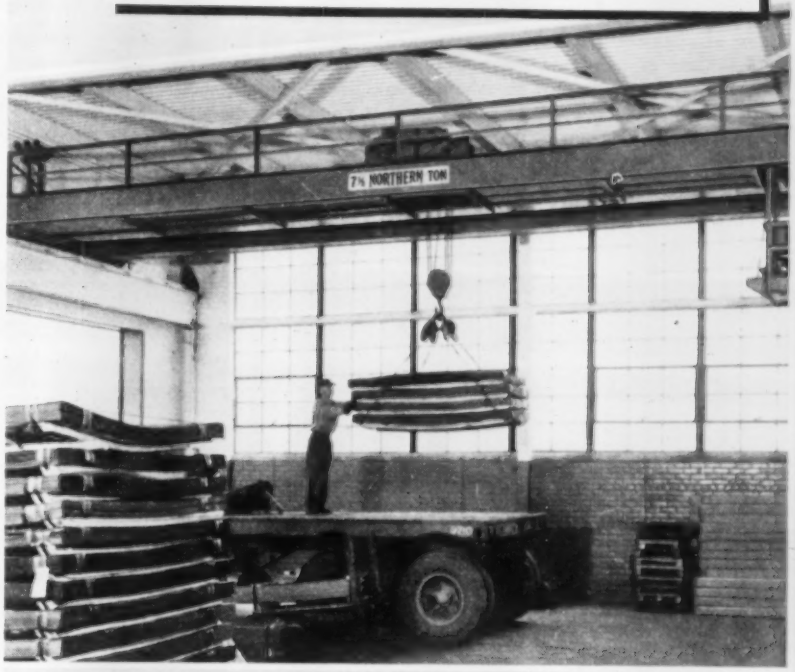
Resin Glues Described

Synthetic resin glues for aluminum alloy joints are described in Volume 7 of "Selected Government Research Reports," a British publication of hitherto undisclosed technical information. It may be obtained from British Information Services, 30 Rockefeller Plaza, New York 20, at $1.70; the order designation is "S. O. Code 51-294-7-star."

NORTHERN

HI-LIFT CRANES

keep them rolling!



WHETHER handling strip, sheet, plate, structural steel or finished parts, a Northern Hi-Lift Crane helps keep your trucks and trailers rolling to make scheduled deliveries; handles big, heavy loads for fast loading; saves time, cost, and ruffled tempers.

For over fifty years Northern Cranes have consistently stressed three essential elements —safety, durability, dependable operation— with ample provision for meeting emergency demands under peak material handling conditions. They keep your production moving and your shipments rolling!

Write for our new Bulletin HL-115

NORTHERN ENGINEERING WORKS

2615 E. Atwater St., Detroit 7, Michigan

OVERHEAD ELECTRIC TRAVELING CRANES AND HOISTS

Machine Brains Dissected At Computing Conference

By H. C. TUTTLE
Detroit Editor, STEEL

ELECTRONIC computers or so-called mechanical brains as tools for industry may be one key to eliminating a lot of guesswork. It is possible to learn from one of these machines where to balance a rotating part so its vibration is minimized, or even how to design an automobile suspension system for smooth riding. They may ultimately be capable of providing information necessary to eliminate fluctuations of the business cycle, or provide up-to-the-minute reports on inventory.

Principles behind computing machines are not new. The Chinese abacus and the slide rule are examples which come readily to mind. Desk calculators and tabulating machines are others which have gained wide acceptance. Automatic transmissions are themselves a form of computer.

To help dispel some of the mystery and misconception surrounding automatic computing machinery, a conference on the subject was held Mar. 27-28 at Wayne University and Rackham Educational Memorial, Detroit, under sponsorship of the advisory committee for Wayne's computation laboratory, the Industrial Mathematics Society and the Association for Computing Machinery.

Although many of the sessions were of an extremely technical nature, several papers were up the business man's alley. Examples: "Some Computing Problems in the Automotive Industry," by Paul T. Nims, on the staff of the chief of engineering research, Chrysler Corp., and vice president, Industrial Mathematics Society; "Electronics for Business—Luxury or Necessity?" by John S. Coleman, president, Burroughs Adding Machine Co.; "A Univac Program for Inventory Requirements," by G. M. Hopper, Eckert-Mauchly Computer Corp.; "Impact of Business on Computing Machinery Design," by E. F. Cooley, Prudential Insurance Co. of America; and "Plans for Tabulating Parts of the 1950 Population Census on an Electronic Computer," by James L. McPherson, Bureau of the Census.

Howard H. Aiken, director, computation laboratory, Harvard University, Cambridge, Mass., spoke on automatic calculators and their applications. It was he who designed the first large-scale digital calculator built by International Business Machines Corp. About eleven of these machines are now in operation in this country; a number of others are being built.

Wayne University has a most complete computing laboratory with two machines—the orginal differential analyzer built by Dr. Vannevar Bush at MIT 20 years ago, and a new cinema integraph, built by Chrysler's Dr. Nims. Further expansion of the laboratory, which is directed by Prof. Arvid W. Jacobson, is envisioned so that a more complete service to midwestern industry can be provided, and so that the training of computing machine experts can be stepped up.

In a planning session preparatory to the Wayne conference, a number of industrial mathematicians from such organizations as General Motors, Ford, Chrysler and Bendix Aviation described how computing machines are helping industry solve problems which would take a lifetime with conventional means or would be impossible of solution. The differential analyzer at Wayne, for example, has already provided a washing machine manufacturer with the answer to where a cylindrical basket should be sprung and balanced so that its vibration would be virtually elim-

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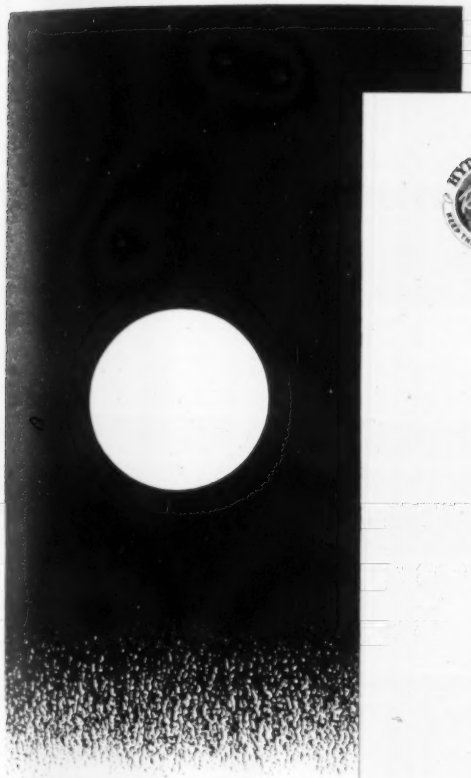


RODGERS HYDRAULIC INCORPORATED

ST. LOUIS PARK, MINNEAPOLIS 16, MINNESOTA

January 2, 1951

Carlton Machine Tool Co.,
Cincinnati, Ohio.

Att: Mr. Kenneth L. Volz

Dear Sir:

I am taking this opportunity to mail you this photograph of our new six foot, nineteen inch column Carlton which we installed September 1950.

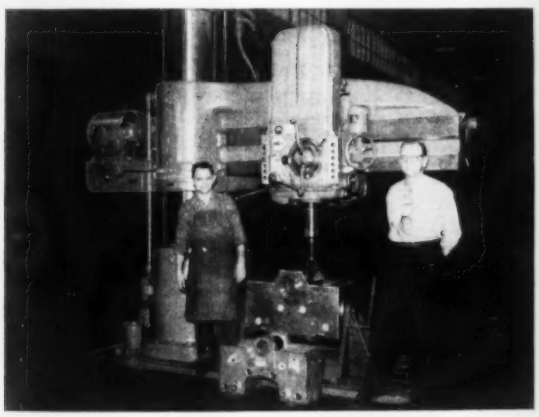
We are designers and builders of all types of Hydraulic equipment. In the past we experienced a great deal of difficulty in building our pumps and heavy equipment not only because of accuracy but also the cost.

Please note the casting in the enclosed photograph. It formerly required approximately eight to nine hours to machine one. I requested a survey on this job. Last January 1950 your Mr. Jim Carlton advised us that this job could be done complete in a radial using a revolving fixture. We are very happy to report that we are now making five complete castings in eight hours and doing a far better job. We believe there is no finer radial built.

I wish to thank you and your company for your advice and wonderful cooperation.

Very truly yours,

Vernon C. Levine,
Plant Supt.



This unsolicited letter from a valued customer tells simply and effectively why Carlton is your best buy in radial drills. Let us know your requirements . . . we'll see that you receive complete information promptly.

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THE CARLTON MACHINE TOOL CO.

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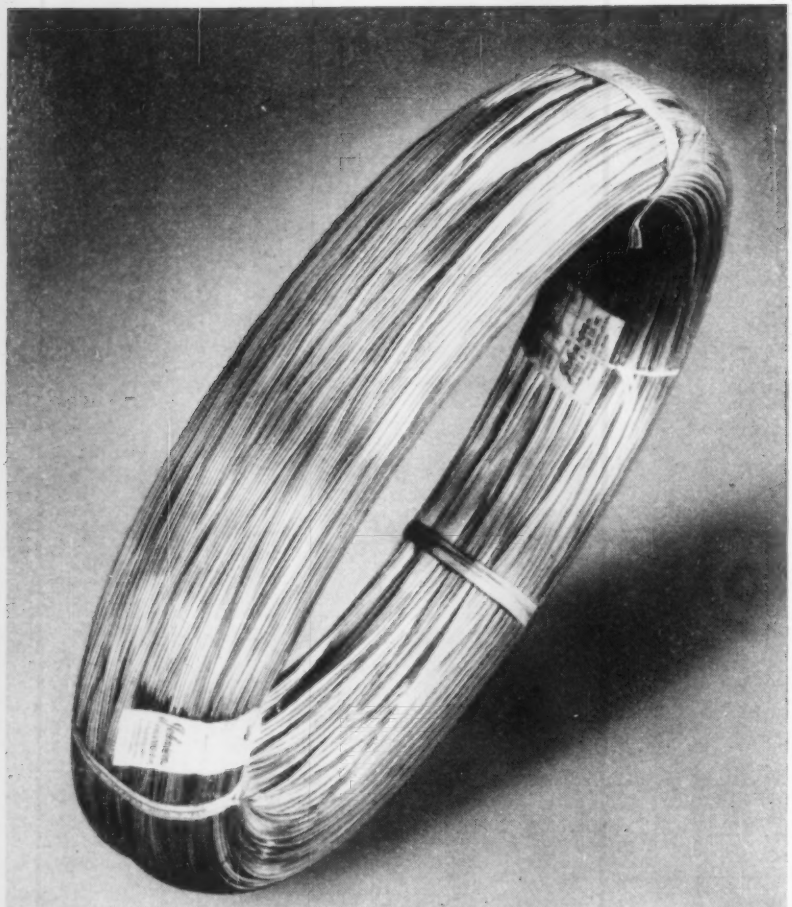

Johnson Quality Wire Is an Economy

For your processes it will pay you well to specify wires made in this specialty mill. You will save time, maintain quality. JOHNSON makes wire as fine as .003".

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- VACUUM HOSE WIRE.
- AIRCRAFT CABLE WIRE.
- HIGH CARBON ROPE WIRE.
- HARD DRAWN SPRING WIRE.
- OIL TEMPERED SPRING WIRE.
- HIGH TENSILE GALVANIZED STEEL WIRE.
- HOSE REINFORCEMENT WIRE (BRAIDED TYPE).
- FLAT AND HALF OVAL SPECIAL SPRING WIRE.
- BRUSH WIRE FOR HAND AND POWER BRUSHES.

If it's steel wire—Johnson makes it better

JOHNSON

JOHNSON STEEL AND WIRE COMPANY, INC.

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inated. It has selected the combination of springs, shock absorbers, tire inflation and car mass which will give the smoothest ride.

Most of the cinema integraph's work so far has been of experimental nature, but one problem which it has worked on is predetermination of the characteristics of a destroyer hull design. Use of this machine for statistical purposes is also believed possible.

One possibility of the differential analyzer is for drawing lines from mathematical formulas which can be transmitted to machine tools through a tracing mechanism so that a certain shape can be duplicated.

Hydraulic Standards Revised

Incorporating changes and additions made at the most recent meeting of the Joint Industry Conference on Hydraulics, the newest edition of the J. I. C. Hydraulic Standards for Industrial Equipment is offered to engineers, designers, hydraulic equipment users and manufacturers by Miller Motor Co., Chicago. The revised standards are reproduced word-for-word in an attractive 16 page booklet conveniently hole punched for inclusion with other reference data.

Along with the standards are presented a sample circuit, glossary of terms, two pages of standard symbols, important information on the various types of piston and rod seals available for different applications, and a point-by-point comparison with cutaway illustrations showing how Miller hydraulic cylinders meet the revised J. I. C. hydraulic standards specifically relating to cylinders and their component parts.

Copies of the new, revised-up-to-date "Standards" are particularly offered to those who wish to replace the now obsolete first issue of the "Standards" with the new, approved issue. Write Miller Motor Co., 4027 N. Kedzie Ave., Chicago 18, Ill.

Tool Advertisers Swap Ideas

Machine tool advertising men are provided with a means for regular discussion of matters of common interest. It is in the form of the Machine Tool Advertising Council "Idea Exchange," sponsored by the advertising committee of the National Machine Tool Builders' Association, Cleveland. In addition to its being a meeting place for machine tool advertising chit-chat, it will also enable the advertising committee to keep all members of the council informed as to its objectives and activities.

Joe Craig, advertising manager of Warner & Swasey, is serving as edi-

tor. Although numerous advertisers contributed to this first issue, it is hoped that many more will cooperate to make future issues even more helpful and thought-provoking. Copies of all issues will be sent to members of the association. Others who are interested may secure copies by addressing their request to NMTBA, 10525 Carnegie Ave., Cleveland 6.

Floors Resurfaced Quickly

A bulletin designed to aid defense plants in solving their floor resurfacing and repair problems, is announced by the Monroe Co. Inc., Cleveland. It describes Swift-Floor, a material over which traffic can roll within 60 seconds after application. It also lists application methods designed to eliminate factory production delays necessitated by the use of ordinary flooring materials.

Material can be applied over wood; concrete, brick or steel—indoors or out, according to the manufacturer. It can be laid without moving machinery or heavy equipment and easily withstands loads up to 50,000 pounds. In addition it is reputed to be fire and spark proof, easy to clean, and can be "pitched" for drainage.

Alcohol Fuel Study Makes Gains

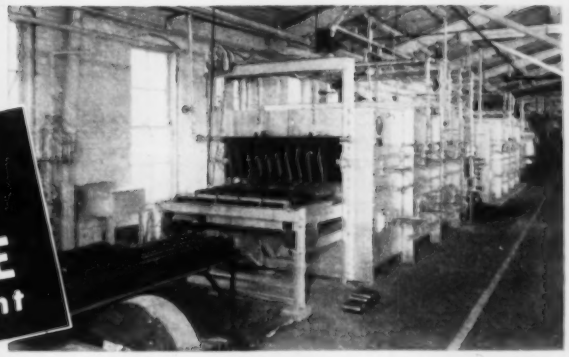
Latest studies of the effect of alcohol as a component in internal-combustion motor fuel reveal advantages for this type according to findings by the Agricultural Research Administration, Department of Agriculture. During 200-hour test runs, cylinder walls showed 0.0005-inch of wear for straight gasoline and 0.0003-inch wear for a mixture of 75 per cent gasoline and 25 per cent denatured alcohol. Carbon deposits from the blended fuel were soft and fluffy whereas those from the straight gasoline were hard. The research seeks an outlet on a large scale in the motor fuel field for alcohol produced from corn cobs and other farm wastes. The development is expected eventually to open up a substantial market for special equipment for this purpose.

Stainless Tubing Data Offered

Technical data valuable to engineers associated with the design, fabrication and application of stainless tubing is offered in a new four-page bulletin published by Babcock & Wilcox Tube Co., Beaver Falls, Pa. Technical bulletin 19, contains condensed data on analyses, oxidation resistance, thermal treatment and mechanical, electrical and physical

EF

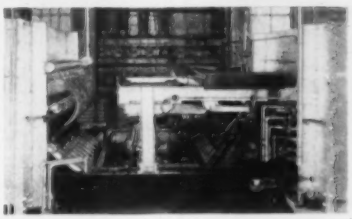
Completely Automatic FURNACE Equipment



HEAT TREATS SHELL FORGINGS—SCALE FREE

• The above illustration shows shell forgings being pushed through an EF gas-fired hardening furnace in parallel tubes filled with protective atmosphere. The forgings are then quenched automatically—reversed without coming in contact with air—and loaded into the tempering furnace.

Let EF engineers with their complete facilities, and the "know-how" gained on hundreds of shell, aircraft, tank, gun, bomb, cartridge clip, ammunition and other projects, help you convert to defense production.



Discharge End of the Hardening Furnace—the Quench, Automatic Reversing, and Loading Into the Tempering Furnace

EF Gas-Fired, Oil-Fired and Electric Furnaces
for any Process, Product or Production
THE ELECTRIC FURNACE CO.
WILSON ST. at PENNA. R. R. Salem - Ohio

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To Your Specifications
ANY SIZE • ANY METAL • ANY QUANTITY
12,000 Sets of Tools are at your disposal. More than a quarter-century of experience in designing and making Special Washers.

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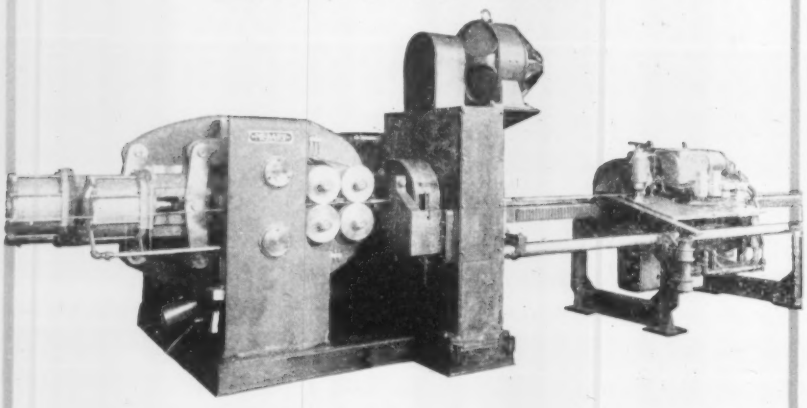
Triple Production or Better on Bar & Tube Turning!

MEDART

RFPD AUTOMATIC CENTERLESS BAR TURNERS

FOR BARS ¼" to 6" DIAMETER



- The unsurpassed production speeds of the RFPD Turner using carbide cutting tools—up to 12 ft. per minute—average from 3 to 4 times that of conventional turners by actual comparison.
- Material turned on this machine can be sold directly from the machine for "as turned" stock, put through the Medart two-roll rotary straightening, sizing and polishing machines for "turned and polished" stock, or given one pass through a centerless grinder for "ground" stock.
- The RFPD turning gives 100% material recovery with short, easy-to-handle chips.
- Direct-drive cutterhead, through single V-belt drive, is a single compact unit designed for either brazed tip or mechanically held carbide tools.
- Controls provide fully automatic push-button operation through entire cycle, and supplementary manual operation for setup. Both speeds and feeds are infinitely variable.

Many other cost-reducing, time-saving exclusives are offered in the RFPD Centerless Bar Turner.

Write For Illustrated Brochure

THE MEDART COMPANY 3535 De Kalb Street St. Louis 18, Mo.

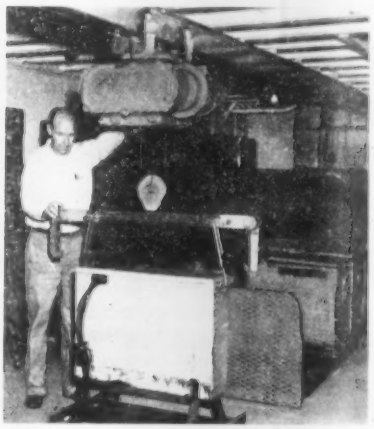
properties on ten of the most popular austenitic and ferritic stainless tubing steels.

Soil Pipe Change Coming

The technical committee of the Cast Iron Soil Pipe Institute has decided upon specifications for a product to be known as Service Weight soil pipe, which will ultimately supersede the present Victory Weight pipe. These specifications are the result of a study made at the request of the National Association of Master Plumbers to bring about industry-wide standardization of soil pipe, so that dimensions critical to laying-out and construction will be uniform.

Service Weight soil pipe, in all probability, will be available from all soil pipe producers in a reasonably short time, depending upon the ability to procure needed manpower and materials for the changing of production equipment now in use. Meanwhile, Victory Weight pipe will be applied to requisitions on hand to the extent of producers' abilities.

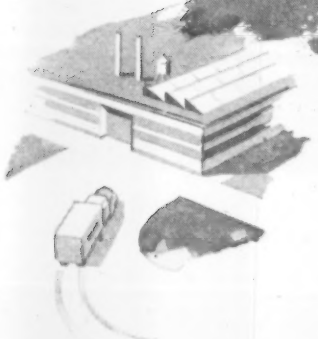
Planning Lowers Battery Costs



BATTERY damage is reduced and maximum use is made of every inch of space in the battery alcove at Wallingford Steel Co., Wallingford, Conn., with a simple, homemade battery-rack. Alcove floor area is 15 by 25 feet and ceiling is 8-feet high. Incoming platform trucks pull up against a metal stop preventing accidental damage to batteries being charged. Lugs at end of batteries are engaged by pickup elements at end of spreader bar which is attached directly to hoist pulley housing to save head room. Smaller "walkie" batteries use elements located about 1 foot from the end as shown in the illustration. They are cradled in the caster mounted structural steel rack to prevent falling when pushed to the charging point

This man...

IS YOUR HELPER!



There is a man in your community who stands at your elbow to instantly supply the tools, materials, parts and equipment you may require in production and maintenance operations of your factory —upwards of 10,000 different products from abrasives to zinc sheets.

What a time-killing task it would be to procure all these items from their infinitely various original sources. How economical and convenient it is simply to phone this man, tell him what you want and know that, often within a matter of minutes, it will be in your receiving department.

Accessible

"This man" is an industrial distributor* or a specialist in certain industrial items. You will find him listed in the classified section of your telephone book-most likely under the heading Bars, bronze or Bearings, bronze. If he is the leading distributor, he almost certainly is the Bunting Distributor. He carries in stock for your money saving convenience Bunting Standard Stock Industrial Bearings, Electric Motor Bearings, and Precision Bronze Bars—ask him for catalog.

* There are approximately 2000 Industrial Distributors serving every industrial section of the United States. In 1948 their total sales were more than $8,000,000,000. They carry an average inventory of $500,000,000, turn their stocks 5 to 6 times per year, fill 200,000 orders per day, have 12,000 outside salesmen and engineers, 10,000 inside telephone order expeditors, operate 8000 trucks delivering merchandise on which their average net profit is .0292 cents per dollar of sales.

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and it is thought advisable to point out that as and when Service Weight pipe is available, the same will be interchangeable, i.e., may be used successfully, with Victory Weight pipe and fittings which are in the stocks of distributors and contractors at that time.

Aircraft Uses Growing

A pictorial report showing the manifold and increasing number of jobs being done by the airplane is issued by United Aircraft Corp., East Hartford, Conn., as a companion publication to the company's annual financial report. The pictorial report contains 101 photographs, 44 of which were taken throughout the country by United photographers. The report, titled "Wings at Work," recounts the story of the swift growth in the number and diversity of the tasks accomplished by the airplane within the past few years.

The role of commercial and military aircraft, especially the Sikorsky helicopter, in the Korean war is cited. More than 1400 wounded or stranded combatants were lifted to safety by the helicopter during the first six months of the conflict in Korea, the publication reports. During the same period, 15,700 patients and casualties from Korea were flown home to the United States by hospital airplanes. The rapid growth of commercial passenger and cargo traffic, which made records last year, is told in pictures and story.

"The volume of air transport and travel was still growing as the old year ended its march past," the report says in conclusion. "In 1951, man was looking, more earnestly than he had ever before, to the airplane for transport, for travel and for defense."

ASTM Discusses Sigma Phase

Effect of the sigma phase on physical, chemical, and mechanical properties of iron-chromium and iron-chromium-nickel alloys is presented in detail in a new publication by ASTM. Entitled "Symposium on the Nature, Occurrence, and Effects of Sigma Phase," this material consists of 11 papers and discussions presented at the 1950 annual meeting of the society.

In the introduction, F. B. Foley of International Nickel Co., states: "There is perhaps no single phenomenon connected with the metallography of the corrosion and heat-resistant iron-chromium and iron-chromium-nickel alloys that has excited more interest on the part of investigators during the past five years than the sigma phase. The studies, as shown by the papers presented in this symposium, have brought into play all the methods available to the physicist and metallurgist aimed at determining: what it is, under what conditions of composition, temperature and time it may form, how it forms and decomposes, how its presence may be detected and what its effects on the physical, chemical, and mechanical properties of the metal may be."

The papers and authors are:

Identification and Mode of Formation and Re-Solution of Sigma Phase in Austenitic Chromium-Nickel Steels—E. J. Dulis and G. V. Smith, U. S. Steel Corp.

Sigma Phase in Several Cast Austenitic Steels—V. T. Malcolm and S. Low, Chapman Valve Mfg. Co.

X-ray Study of the Sigma Phase in Various Alloy Systems—Pol Duwez and S. R. Baen, California Institute of Technology.

Sigma Phase in Chromium-Molybdenum Alloys with Iron or Nickel—J. W. Putman, N. J. Grant and D. S. Bloom, Massachusetts Institute of Technology.

The Tetragonality of the Sigma

Stressing latest cost and time-saving features, De Mattia equips with...

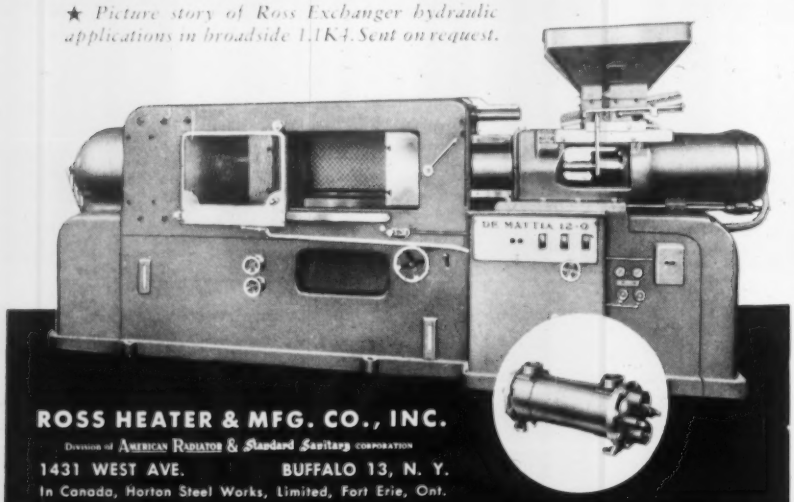
ROSS EXCHANGERS

Handling 130 lbs. of plastic material per hour, this 12-ounce De Mattia horizontal injection molding press relies on an oil pump capacity of 60 gpm @ 1000 psi max. to maintain peak production.

And to safeguard full capacity, De Mattia presses are factory-equipped with Ross Type BCF Exchangers . . . compact, fully standardized, all-copper and copper alloy units that give maximum protection against pump slippage, internal leakage and breakdown of vital properties *by keeping the oil temperature within safe and efficient limits.*

Says Brosites Machine Co., general sales managers for De Mattia equipment: "Ruggedly built for long, hard service, these presses incorporate the latest cost and time-saving features. All are equipped with Ross Type BCF Exchangers for cooling the hydraulic oil."

★ *Picture story of Ross Exchanger hydraulic applications in broadside LIKE. Sent on request.*



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with GULF "LASUPAR" and "ELECTRO" CUTTING OILS

Why have users of the new Gulf sulphurized cutting oils been able to step up feeds and speeds on tough machining jobs? Because, thanks to a special Gulf process of combining sulphur, Gulf Electro and Lasupar Cutting Oils provide greater sulphur activity over the entire range of a cutting operation.

This intensified chemical action insures better protection for the tool at elevated production rates—helps reduce built-up edge, prevents chip welding, prolongs tool life.

Because Gulf Electro Cutting Oil contains a larger percentage of this extremely active sulphur ingredient, it is recommended for the toughest machining jobs, where production and tool life are problems.

Gulf Lasupar Cutting Oil also contains stable sulphurized fatty oil, effective in producing the fine finishes for which this quality cutting oil is so well known.

Operators everywhere welcome the new Gulf Lasupar and Electro Cutting Oils—because they get all these production advantages without the disagreeable odor ordinarily associated with sulphurized cutting oils.

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Yes, Pheoll "COLD-HEADING" AND ROLL THREADING PROCESSES MAKE BETTER PARTS...
Stronger, Faster, Cheaper

Countless small parts usually made by conventional turning processes — by stamping, drawing, casting or molding — can be made *better . . . stronger . . . cheaper* by *cold-heading* and roll threading.

Machining of Cold-Headed Parts is hardly ever necessary because shank and head dimensions can be held to very close tolerances. Rolled threads are produced to American Standard dimensions.

Here are just a few of the many parts formed or roll threaded . . .

Screws	Plastic Inserts	Stems
Bolts	Thumb Screws	Arms
Studs	Wing Nuts	Plugs
Rivets	Small Gears	Prongs
Rods	Tongue—Clevis	Points
Links	Segments	Hooks

Single or multiple secondary operations can be performed on cold-headed parts to produce special characteristics required to fit the part for its particular application. These secondary operations include drilling, tapping, milling, shaving, flattening, notching, flanging, trimming, serrating, bending, off-setting, slotting, fluting, swaging, knurling, pointing, heat treating, plating and finishing.

ARE YOU MISSING THIS SAVING?

Write or call in a Pheoll engineer. Explain your production problems. He will tell you where you can save money, speed production, improve your product appearance.

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Phase in the Iron-Chromium System —L. Menezes, J. K. Roros, and T. A. Read, Columbia University.

The Formation of Sigma Phase in 17 per cent Chromium Steel—J. J. Hegers United States Steel Co.

Sigma Phase and Other Effects of Prolonged Heating at Elevated Temperatures on 25 per cent Chromium —20 per cent Nickel Steel—G. N. Emmanuel, Babcock & Wilcox Tube Co.

The Occurrence of the Sigma Phase and Its Effect on Certain Properties of Cast Fe-Ni-Cr Alloys—J. H. Jackson, Battelle Memorial Institute.

The Formation of Sigma and Its Influence on the Behavior of Stabilized 18 per cent Chromium—8 per cent Nickel Steels in Concentrated Nitric Acid— R. S. Stewart and S. F. Urban, National Lead Co.

Some Notes on the Structure and Impact Resistance of Columbium-Bearing 18-8 Steels After Exposure to Elevated Temperatures—W. O. Binder, Union Carbide & Carbon Research Laboratories.

Observations of the Effect of Sigma on the Mechanical Properties of Columbium—Stabilized Weldments in Austenitic Stainless Steels—F. W. Schmitz and M. A. Scheil, A. O. Smith Corp.

Copies of the 188-page, illustrated symposium (STP No. 110) can be obtained, in heavy paper cover, from American Society for Testing Materials, 1916 Race St., Philadelphia 3, at $2.50 each.

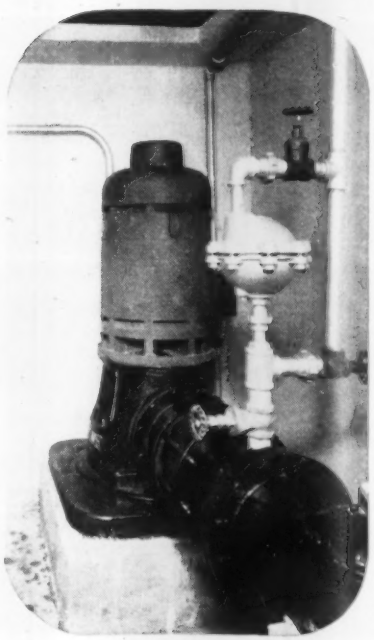
Lubrication Made Automatic

Automatic 12-point lubricator was especially designed for automobile body conveyors by the J. N. Fauver Co. Inc., Detroit. It is installed on one of the latest power and free type of conveyors that passes through wash and paint booths in a new plant of one of the biggest of the automobile body builders.

All of the critical points of wear are reached with this controlled lubrication that were formerly lubricated by hand. The 2 gallon reservoir, sufficient for a two-week supply, is equipped with air regulator and pressure gages, as well as the necessary manifolds, flexible connections and nozzles required to deliver oil to the vital points.

Investment Castings Data

General, technical and design data for precision investment castings is available to engineers, designers and others interested, in a publication recently issued by Hitchiner Mfg. Co., Manchester, N. H. This booklet covers costs, tooling, both small and large quantity production, how complex shapes can be handled, size limi-



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SERVING
WICHITA, KANS.

In 1938, Layne installed twenty-five top performing well water units to give Wichita 48 million gallons of water daily,—enough, so city officials estimated for all needs until 1960. Then came World War II and Wichita gained many new industries and a big growth in population. The demand for water quickly became greater than the supply.

Layne was called in and given a contract for seventeen new wells to be completed without delay. Layne crews swung into action and drilled the wells, set casing, sand screens and pumps. Including testing time, a new well was completed every nine days until all seventeen were in service—increasing Wichita's total supply to 62½ million gallons daily, making this city the second largest municipal ground water user in the Nation.

Whether for an emergency or for normal needs, Layne is always in a position to do an outstanding job in the development of ground water for any purpose. For catalogs, folders etc., address

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tations, finish and tolerances. One section of this folder is devoted to the physical properties of investment castings and another to basic designing information.

Ductile Bismuth Produced

Fitzpatrick Electric Supply Co., Muskegon, Mich., announces the successful production of ductile bismuth wire and ribbon which permits engineers to make useful applications of a material possessing unique electrical properties. While all the electrical and physical properties of bismuth were known at the turn of the century, no research was possible. Therefore, no practical use was developed by industry because there was no known way to use bismuth commercially due to its brittleness and its lack of tensile strength.

Company claims to have overcome these difficulties to a large extent. They have bismuth ductile enough to wind on its own diameter at room temperature, or about 70° F. However, its tensile strength is low; has to be handled with care, that is, not subjected to a strain exceeding its tensile strength. Keeping this in mind, it is possible to wind coils, make non-inductive prods, make transformers, etc. without failures.

Possibilities of development in the control and instrument fields by the use of ductile bismuth are tremendous. Bismuth has no near competitors, the company says, and offers the following characteristics greatly in excess of all other materials:

1. Resistance change in a magnetic field. This opens up an automatic voltage control, controlled output in watts, etc., overcoming errors due to voltage drop, instrumentation, calculators, fogging of x-ray pictures due to voltage variations, etc. Any quantity of current can be controlled through tubes.

2. Voltage change due to Hall effect. Locating ferrous metals, submarines, for alarm systems, signals and many other applications.

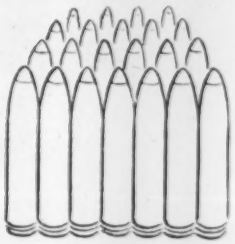
3. A variable rectifier; in fact, the only variable rectifier known. What its uses will be is unknown, but it will be used in the near future.

4. Hot and cold junction for instrumentation, refrigeration, etc.

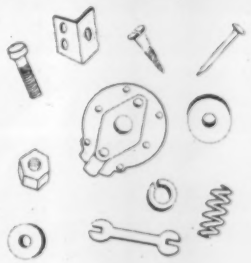
5. Most negative material known for thermocouples; exceeds all others by over 100 per cent, giving —69 microvolts per degree C change against platinum from 0 to 100° C.

6. Best material for resistance (ohms) change due to temperature change for instrument control. 720 ohms mil ft. Makes possible the use

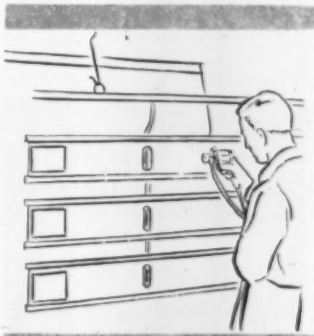
LET *Detrex* HELP MEET GOVERNMENT SPECIFICATIONS



• Ammunition must be produced faster than ever before! Regardless of processing specifications, Detrex can furnish equipment or chemicals to meet ordnance requirements.



• Where military orders call for metal parts to be rustproofed, Detrex PERM-COTE (phosphate coating process) will produce results beyond specifications.



• Finishing departments operate efficiently when paint spray booths are functioning properly. To secure maximum production hours, precoat booth walls with Detrex PRD or VINCOTE. Paint overspray then becomes a minor maintenance problem.

• For cleaning prior to painting, plating, heat-treating, or inspection, finishing superintendents depend upon Detrex products and processes for both defense and civilian goods. For complete information on degreasing, alkaline and emulsion cleaning, rustproofing, contact Detrex now!

104A

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Let us send an Electro Field Engineer to you when special jobs need individually engineered grinding wheels.

When multiple castings of similar kind are to be worked, an Electro Wheel, or Wheels, graded as to composition and shaped and sized to that particular casting and skill of the operator, will do a much better job faster and at lower cost. Makes sense, doesn't it?

Electro Portable Wheels are specifically engineered as to size, shape and composition to the job in hand.

Let us prove on your job the higher efficiencies in Electro Portable Wheels. And while we're at it, let us also show you what Electro Wheels can do for you in Cutting-Off, Rough and Precision Grinding. Write, wire or phone. No obligation for Field Engineer cooperation at job side.

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RESIN BONDED GRINDING WHEELS

of a small amount of wire for giving an appreciable change in resistance per degree.

7. Alloy of 95 per cent bismuth, 5 per cent tin is also ductile. Most positive alloy known for thermocouples, giving +57 microvolts per degree C change against platinum 0 to 100° C.

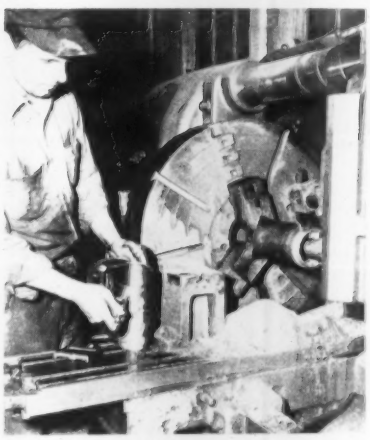
8. The alloy listed above is better than pure bismuth for resistance ohm change having a resistance of 2150 ohms/mil ft.

The company offers a 20 page booklet entitled, "Ductile Bismuth Wire—The Magic Metal of the Age."

Plastics Are Also Scarce

Manufacturers who plan to use plastics as substitutes for scarce metals had better look twice if they don't want to be disappointed, says Frank H. Carman, assistant secretary in charge of plastics of the Manufacturing Chemists' Association, New York. Mr. Carman says that many types of plastics are in shorter supply than steel or aluminum, despite tremendous increases in production since World War II. "If an end use is not of sufficient essentiality to justify the use of these metals, then it is questionable if plastics could be made available through

Carbide Does Two Jobs at Once



TURNING AND BORING using virtually standard carbide tools results in lower costs and higher output in machining the sleeve shown in the photograph. The part, a liner, is made of extremely close grained centrifugal cast iron. Tools use standard Carboloy blanks, grade 44A. A speed of 140 sfm at a feed of 0.018-inch is used for the ¼-inch roughing cuts and 189 sfm at 0.020-inch feed for the 0.015 to 0.030-inch finishing cuts. Tool life on this job is long and means a low tool cost

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MATERIALS HANDLING EXPOSITION
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APRIL 30 — MAY 4, 1951

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Try out the hand-propelled crane and feel for yourself its smooth easy operation.

See the new revolutionary automatic bridge interlock—you'll be delighted.

Check on the new Tramrail sliding shoe current collector —outlasts old wheel-type many times.

Operate the motor-driven crane and note its many points of superiority.

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Because plants in nearly every conceivable industry are enjoying numerous advantages possible with Cleveland Tramrail, we feel certain you, too, will find many places where a hoist, a crane, or perhaps an extensive Tramrail System can be used profitably.

We invite and urge you to visit our display where you can study our equipment first-hand. You are going to pick up new valuable ideas on materials handling equipment which can mean much to your company and its production problems.

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work better... last longer

DESPITE all the care you lavish on the design and construction of your product, its successful performance may ultimately depend on a few, relatively small, gears. That's why it makes good sense to use only gears of *established quality*. FAIRFIELD GEARS have proved themselves "in use" on an almost limitless range of industrial products during the past 30 years. They are made-to-order—any type, and in a wide variety of sizes—to meet your special needs.

On your next gear problem, call in FAIRFIELD at the start. FAIRFIELD engineers are qualified to make expert recommendations that may save you time, money and future concern about gear performance in your product. Write for interesting, illustrated brochure.

Fine Gears made to order:

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HERRINGBONE • HELICAL • DIFFERENTIALS
SPUR • WORMS AND WORM GEARS

FAIRFIELD MANUFACTURING CO.

for FINE GEARS

303 S. Earl Ave. Lafayette, Indiana

NPA or government allocations," he states.

Civilian requirements for plastics are now far greater than ever before, not only on a tonnage basis but also in proportion to other engineering materials, according to Mr. Carman, and this has created problems with respect to further expansion. The quantities in which the industry must now think and plan, he points out, have reached such magnitude that any blueprints for expansion must go all the way back to the basic raw materials. "No longer can any substantial increase be obtained simply by diverting a little more of an industrial chemical from some other use to plastics production. Plastics are now a major claimant for basic chemicals and must compete with other essential end uses for the available supply."

But despite their rapid growth, plastics are still dwarfed by the metals on a tonnage basis, so even if they were available they could make little impression on the shortages of steel and aluminum. He cites current plastics production figures as totaling about one million tons a year, compared with 100 million tons for steel.

"Plastics generally should not be regarded as substitutes," Mr. Carman emphasizes, "but as basic engineering materials supplementing wood, metal, fibers and ceramics. In many cases they are superior to other materials; conversely, they make poor substitutes if improperly used."

Chart Aids Rust Fight

Dearborn Chemical Co. has prepared a check chart to help guard against the costly invasion of rust in plants. Chart consists of a plant diagram showing all vulnerable spots where rust is most likely to attack requiring expensive repair or replacement of vital parts or equipment. Companies may secure charts by writing Dearborn Chemical Co., 310 S. Michigan Ave., Chicago 4.

Die Casters Have Safety Manual

American Die Casting Institute announces publication of the first complete safety manual designed specifically for die casting plants. The manual differs from anything else that has ever been available to die casters because for the first time it covers step by step the entire area of a die casting plant and its specific safety procedure.

Manual was written by die casters

who specialize in safety procedures. Furthermore, it was aimed at the small and medium sized plant. Every attempt was made to present material in a manner that permits the small plant to easily adopt the procedure.

Printed on heavy stock in two colors, the manual is presented in a cloth covered loose leaf binder to permit inclusion of in-plant programs. It is profusely illustrated and contains many prints of safety devices, control forms and reference data. Distribution will start May 1. Price is $5.00 per copy from American Die Casting Institute Inc., 366 Madison Ave., New York 17.

New Foundry Sand Acclaimed

Synthetic foundry sand made from crushed olivine rock can be used in place of silica molding sands, according to reports from the University of Washington. The investigation has found that the olivine sand has less tendency to cause silicosis than quartz dusts. Added advantages for the new sand are higher fusion point and lower cost than silica sands. West Coast foundries can reduce transportation costs by use of the olivine sand since it occurs in quantity in the state of Washington. Commercial tests of the sand have given excellent results.

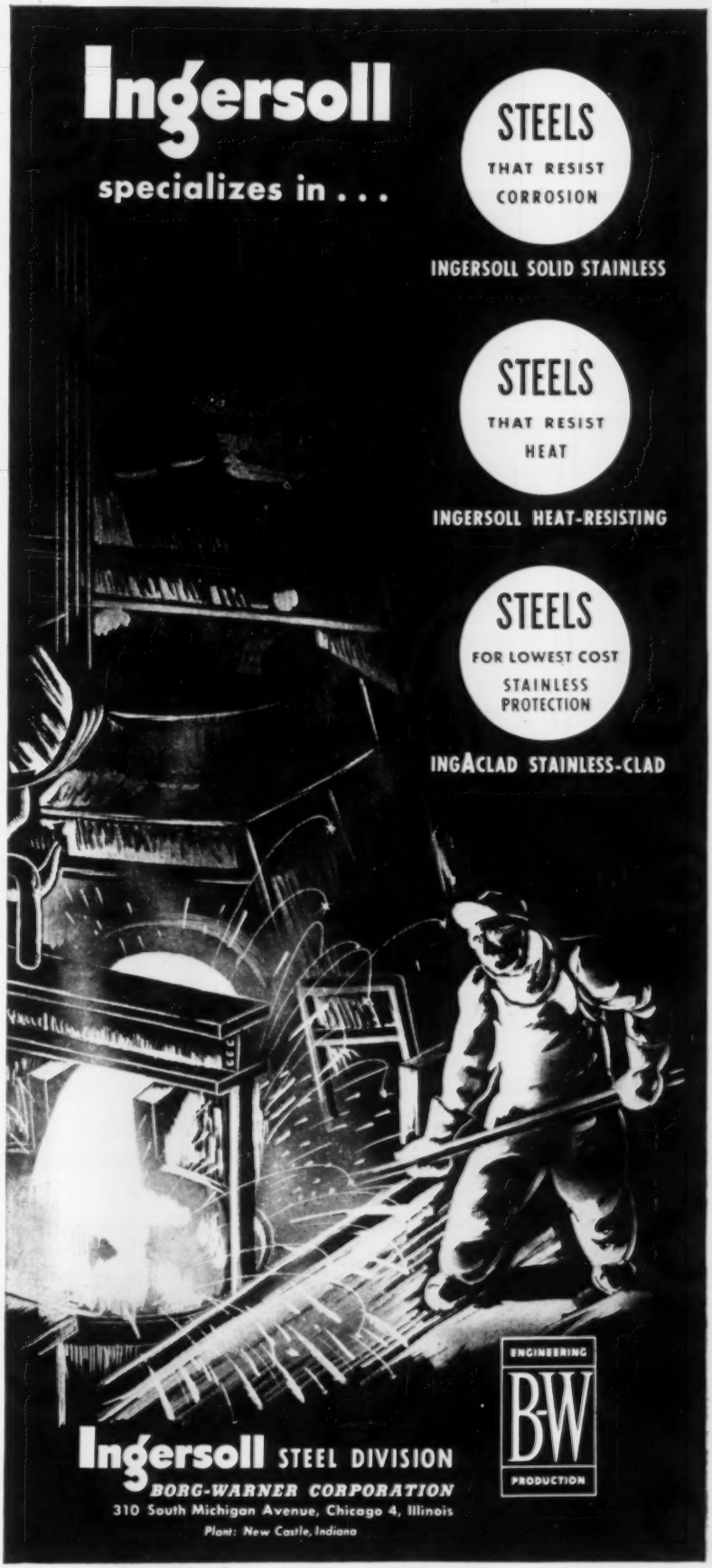
Plating Substitutes Described

A detailed technical bulletin on the use of zinc plate and iridite chromate chemicals to replace conventional chrome plating in producing bright decorative finishes has been released by Allied Research Products Inc., Baltimore. In describing the use of the iridite chemicals in such finishing systems the bulletin sets forth comparisons of the appearance, corrosion resistant and abrasion resistant characteristics of the finished surface.

Copies may be obtained by writing the manufacturer at 4004-4006 E. Monument St., Baltimore 5, Md.

Will Bamboo Do the Trick?

To what extent can bamboo be substituted for steel in reinforcing concrete? This question, explored in World War II under a War Production Board research contract, has been revived in the present emergency. Data are set forth in PB 101839, available from the Office of Technical Services, Commerce Department, Washington 25, D. C., at $1 per copy.



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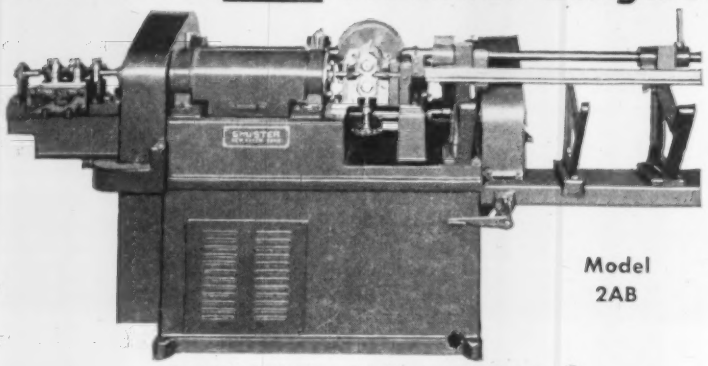
SHUSTER

Cut Costs AND Accurate Lengths!



Model 2AB

Capacity: 3/16" dia.—⅝" dia. (BASIC WIRE)

Automatic

WIRE STRAIGHTENING AND CUTTING MACHINE

This new "SHUSTER"—with its five gear-driven straightening rolls—handles even badly twisted wire with ease. Square and rectangular as well as round wire may be straightened and cut to exact lengths. Other "Shuster" features that assure high speed, quality production are: almost continuous wire travel, rapid cut-off, V-belt motor drive, ball and roller bearings, and extreme rigidity throughout. Write for details.

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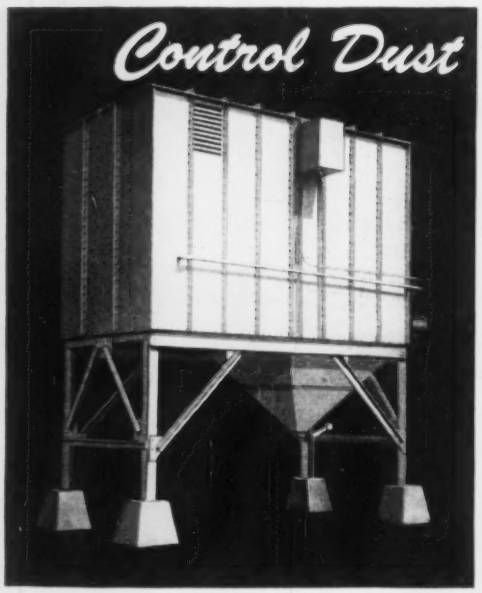

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A Ruemelin Tubular Type Cloth Filter is the modern way to handle industrial dusts created in foundry cleaning rooms, metal working plants, cement mills and many other applications. The simplicity of Ruemelin Dust Filter design means low operating and maintenance costs. Definite power savings are assured by lower resistance to air flow.

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CALENDAR OF MEETINGS

‡ Denotes first listing in this column.

Apr. 2-5, Boston and Apr. 9-12, Cleveland, American Chemical Society: Annual meeting. Society address: 1155 16th St., Washington 6.

Apr. 2-5, American Society of Mechanical Engineers: Spring meeting, Biltmore Hotel, Atlanta. Society address: 29 W. 39th St., New York 18.

Apr. 2-6, Radioisotopes in Industry, Conference: Case Institute of Technology, Cleveland. Conference address: Case Institute of Technology, Cleveland 6.

Apr. 4-6, Midwest Power Conference: Sherman Hotel, Chicago. Conference address: Illinois Institute of Technology, Technology Center, Chicago 6.

Apr. 5, National Metal Trades Association: Annual meeting, New England Congress, Sheraton-Biltmore Hotel, Providence, R. I. Association address: 122 S. Michigan Ave., Chicago 3.

Apr. 8-12, American Hardware Manufacturers Association: Spring convention, Biltmore Hotel, Palm Beach, Fla. Association address: 342 Madison Ave., New York 17.

Apr. 8-12, The Electrochemical Society Inc.: Annual convention, Park Hotel, Washington. Society address: 235 W. 102nd St., New York 25.

Apr. 9-10, American Institute of Steel Construction: Spring engineering conference, William Penn Hotel, Pittsburgh. Institute address: 101 Park Ave., New York 17.

Apr. 10-11, Westinghouse Machine Tool Electrification Forum: Westinghouse Electric Corp., sponsor, William Penn Hotel, Pittsburgh. Forum address: 306 Fourth Ave., Pittsburgh 30.

Apr. 10-11, Society of Automotive Engineers: Annual earthmoving industry conference, Peoria, Ill. Society address: 29 W. 39th St., New York.

‡Apr. 11-13, American Institute of Electrical Engineers: Southern district meeting, McFadden-Deauville Hotel, Miami Beach, Fla. Society address: 33 W. 39th St., New York 18.

Apr. 15-18, Scientific Apparatus Makers Association: Annual meeting, all sections, The Greenbrier, White Sulphur Springs, W. Va. Society address: 20 N. Wacker Drive, Chicago 6.

‡Apr. 16-18, Society of Automotive Engineers: National Aeronautic Meeting, Hotel Statler, New York. Society address: 29 W. 39th St., New York 18.

Apr. 16-18, American Society of Lubrication Engineers: Annual convention and show, Bellevue Stratford Hotel, Philadelphia. Society address: 343 S. Dearborn St., Chicago 4.

Apr. 18-21, National Screw Machine Products Association: Annual meeting, Netherland Plaza Hotel, Cincinnati. Association address: 13210 Shaker Square, Cleveland 20.

Apr. 19-20, American Machine Tool Distributors Association: Annual meeting, Edgewater Beach Hotel, Chicago. Association address: 1900 Arch St., Philadelphia 3.

Apr. 22-26, American Ceramic Society: Annual meeting, Palmer House, Chicago. Society address: 2525 N. High St., Columbus, O.

Apr. 23-26, American Foundrymen's Society: Annual national technical convention, Buffalo. Association address: 616 S. Michigan Ave., Chicago 5.

Apr. 25-26, Metal Powder Association: Annual metal powder show, Cleveland Hotel, Cleveland. Association address: 420 Lexington Ave., N. Y. 17.

Apr. 30-May 4, Materials Handling Institute: Fourth National Materials Handling Exposition, International Amphitheatre, Chicago. Institute address: 1108 Clark Bldg., Pittsburgh.

New Products and Equipment

Higher Gear Loader

A wheel tractor loader featuring a hydraulic torque converter drive and a clutch-type transmission is manufactured by Tractomotive Corp., Deerfield, Ill. It is called the TL-10 Tracto-Loader. Single stage torque converter furnishes a smooth, constant flow of power to the drive wheels. There is practically no spinning of wheels while loading and crowding action is improved. Loading in a higher gear is possible, operation is easy and there is little wear and tear on clutches and other parts.

Clutch-type transmission eliminates most gear shifting. Two multiple

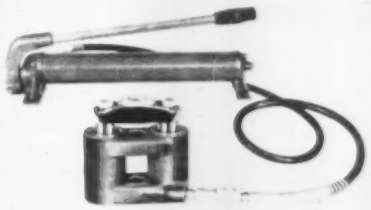
disk clutches are built into the transmission, one for forward speeds and the other for reverse. Only one clutch is engaged at a time. Reverse speed is almost twice as fast as forward speed and four speed ranges are available in either direction. Tractor has a ¾-cubic yard capacity, hydraulically controlled bucket and weighs 10,650 pounds. There is ample bucket clearance and reach to load average size dump trucks. Power is furnished by an Allis-Chalmers 40.5 brake horsepower gasoline engine.

Check No. 1 on Reply Card for more Details

Puller Packs Power

Most pulling and pushing jobs can be done easily, quickly and safely with a new lightweight compact hydraulic puller made by Owatonna Tool Co., Owatonna, Minn. Weighing less than 10 pounds and developing 15 tons of power, the Power-Twin has a center hole which makes it readily adaptable to all OTC pulling systems now in use.

The center hole and twin cylinders permit the unit to get at jobs inaccessible with a hydraulic ram. It is 5½ inches high and works rapidly in any position. Ram travels 2 inches which is adequate for almost all

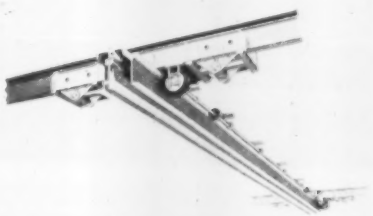


pulling jobs, another bite takes care of the balance. Remote control pump develops 10,000 psi, 6 feet of high pressure hose allows operator to stand a safe distance from the works. Wire guards protect hose and special non-leak couplers are tested for 24,000 psi.

Check No. 2 on Reply Card for more Details

Two Monorails Added

Additions to its overhead crane line are announced by American MonoRail Co., 13107 Athens Ave., Cleveland 7, O. A constant service crane, illustrated, features articulated trolleys designed so that each wheel bears its full share of the load in perfect alignment with the craneway tracks. Capacities available are 3, 5 and 10 tons with the largest size being a double bridge unit. Friction is eliminated by thrust bearings at all load bearing points resulting in



perfectly articulated trolley travel. Two methods of propulsion are available: Fluid drive using the hydraulic coupling principle and a heavy gear drive consisting of slip ring motor with heavy duty gear reducer directly connected to the drive shaft.

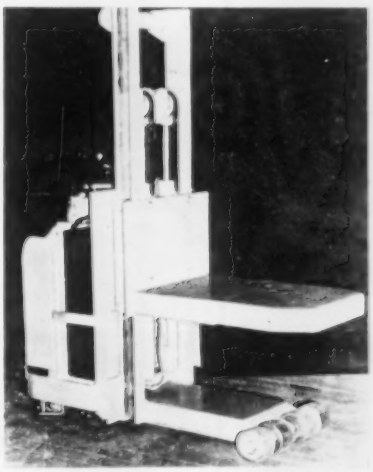
Second model is a carrier originally designed for delivery of core sand to storage hoppers at core makers benches and core blowing machines. It consists of a standard MonoTractor for horizontal propulsion on the tracks, a twin hook Electro Lift hoist and a special bucket mounted so that the gear motor can turn the bucket one complete revolution.

Check No. 3 on Reply Card for more Details

Storage Space Saver

Expansion of the Spacemaker line to include a 4000-pound capacity model for stacking and tiering skids is announced by Lyon - Raymond Corp., 91-79 Madison St., Greene, N. Y. Features of the line that permit it to be used in narrow aisles and crowded working areas have been incorporated in the heavier capacity truck.

Model is available with a standard 24-inch wide platform with lengths ranging from 30 to 48 inches. It is



offered with a lowered height of either 7 or 11 inches. With the standard 83-inch mast, 58 inches of elevation can be furnished. Tractor is equipped with a 10-inch drive wheel and two 7-inch stabilizing wheels mounted on a spring suspended swivel caster. All wheels have rubber tires. Trucks can right angle stack from aisles 24 inches wider than load length.

Check No. 4 on Reply Card for more Details

Many Welding Advantages

Selenium rectifier type direct current arc welder made by Miller Electric Mfg. Co., Appleton, Wis., is available in two models 40 to 250 amp and 60 to 375 amp. Features giving high efficiency requiring minimum maintenance are: Arc start surge, electric current control making possible remote control operation, no moving parts to wear out, instantaneous voltage recovery producing greater arc flexibility, low starting current, min-

imum arc blow and no accidental polarity reversal.

Lifting hooks are provided on the side of the welder so it can be handled with an overhead hoist. Ampere indicator is located on front of welder for visibility by the operator from a distance without his having to return to the welder to check the setting. Standard input power requirement is 220/440 v, three phase, 60 cycle ac current. The knob type current control and off and on switch is located on the front panel. In application where it is required, welders can be used effectively for inert gas welding processes. Units can be paralleled for high current applications.

Check No. 5 on Reply Card for more Details

Small Screws Produced

A single purpose Tornos automatic screw machine made in Switzerland is available from Carl Hirschmann Co., 30 Park Ave., Manhasset, N. Y. It is designed for the high speed production of very small precision screws. Type TV works on the same principle as other Tornos models with sliding headstock. Combination of four radial tools for the turning, forming or cutting off operations, a very sensitive threading spindle and a slotting attachment of new design, enables production of high precision screws with maximum output.

By means of multiple cams, screws of different sizes can be produced without changing the tooling and without loss of production time. A special model with headstock spindle stopping device is available. This device eliminates the trouble usually experienced when threading small screws by means of the overlapping process. Spindle stopping device, consisting of a friction clutch, is controlled by adjustable cams and can be set at any time during the cycle of the cam shaft. Stock capacity of the machine is 5/32-inch, maximum length is 1 inch, maximum headstock speed is 12,000 rpm and maximum speed of the cam shaft is 120 pieces per minute.

Check No. 6 on Reply Card for more Details

Heating Efficiency

A small, gas-fired baking oven made by Carlson Co., 277 Broadway, New York, N. Y., is especially useful for making or tempering small production orders and for heating samples so that heating production orders at the same temperature in large ovens will yield the same results. It is also useful in shops and laboratories for research, testing, precipitation hardening of beryllium-copper and other alloys, relieving hydrogen-embrittlement, drying cores, baking molds and plastics and similar uses.

Outside dimensions are 14 inches wide, 16 inches deep and 20 inches high. Heating chamber is 10 inches

Versatile!

General machine shop and maintenance work often require an all-purpose heavy duty open-gap forcing press adaptable to the many kinds of operations involved. That's what makes this versatile 100-ton R. D. Wood HydroLectric Press valuable to you, from both cost and production standpoints. Moreover, it's used for machinery and appliance component assembly on a production basis, with the addition of suitable fixtures and accessories. It's made in various sizes and capacities.

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R. D. Wood Company

PUBLIC LEDGER BUILDING, PHILA. 5, PA.

Over the Long Haul

The FERRY CAP Spring Bolt *Proves its Mettle*

This Ferry Cap Spring Bolt is one of hundreds of different designs which we make for leading truck manufacturers. We manufacture them to various head shapes, with oil holes and grooves of different kinds, and flats accurately milled. Precision is a principle at Ferry Cap.

The bolt has maximum ground surface-wearing qualities. It is case hardened to proper depth, achieving a hard surface with a relatively soft core, assuring both long wear and high fatigue strength. The thread end is annealed to make it tough, but not brittle—more than equal to the required thread strength.

The body is ground to close tolerance, oil holes expertly drilled, and flats milled to a smooth, true surface to allow free flow of lubricants. The cotter holes, accurately drilled, are free from burrs. Result—the bolt fits perfectly.

It is a spring bolt of which any truck manufacturer can well be proud—a clean cut, precision-made, long-wearing, tough, dependable product.

The FERRY CAP & SET SCREW Co.

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CAP AND SET SCREWS • CONNECTING ROD BOLTS • MAIN BEARING BOLTS • SPRING BOLTS AND SHACKLE BOLTS • HARDENED AND GROUND BOLTS • SPECIAL ALLOY STEEL SCREWS • VALVE TAPPET ADJUSTING SCREWS • AIRCRAFT ENGINE STUDS • ALLOY STEEL AND COMMERCIAL STUDS • FERRY PATENTED ACORN NUTS

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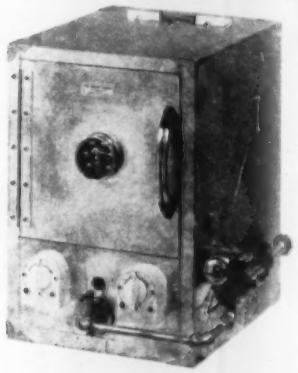
wide, 9 inches high and 20 inches deep with two shelves. Operating range is 250 to 650° F. Other features are: Pyrometer actuated con-

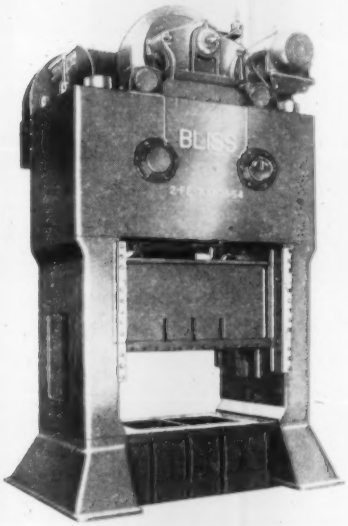


troller, 3-inch dial thermometer, two 60 minute timers and 2 inches of insulation. Net weight of the unit is 75 pounds.

Check No. 7 on Reply Card for more Details

Press Line Added

Development of a line of two-point eccentric presses for general-purpose blanking, forming and drawing is announced by E. W. Bliss Co., Canton, O. The two main gear eccentric units



are designed with heavy sections mounted on and keyed to extremely large diameter shafts. Torsional and axial deflections are practically eliminated by having the shafts revolve in crown bushings. Maximum rigidity is achieved through use of short uprights and deep crown sections.

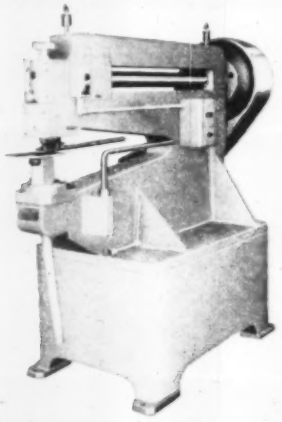
Lubrication is automatic, consisting of a combination of cascade and pressure types. Drive is double-

geared, with two separate intermediate shafts running in oil bath. The Bliss single-disk pneumatic friction clutch is furnished as standard equipment. Brake is integral with the clutch and arranged to prevent engagement of both at the same time.

Check No. 8 on Reply Card for more Details

Odd Shapes Cut

Campbell Machine Division, American Chain & Cable Co. Inc., Bridgeport, Conn., announces a new line of nibbling machines. Machines cut odd shapes of ferrous and nonferrous metals quickly, cleanly and inexpensively. Work can be fed in any direc-



tion because it is cut with a rapidly moving circular punch which operates over a circular die.

All models have two-speed drive and variable stroke. Five models are available with throat depth varying from 24 to 36 inches and capacity for cutting low carbon steel ranging from ¼ to ½-inch. Model number 430, illustrated, has a 30-inch throat depth and will cut carbon steel and soft materials up to ⅜-inch and corrosion resisting steel up to ¼-inch.

Check No. 9 on Reply Card for more Details

• • •

SURFACE PLATE—Known as Micro-Flat, a black granite plate that is harder than tool steel is offered by Collins Granite Surface Plate Co., Los Angeles 21, Calif. It is nonmagnetic, nondeflecting, nonglaring and requires no oiling. It is available in sizes from 9 x 12 inches to 54 x 108 inches.

Check No. 10 on Reply Card for more Details

QUICK CHANGE COLLET: An improved master collet in which pads can be changed without removing collet from the machine spindle is available from Sutton Tool Co., Sturgis, Mich. Pads are securely locked by a holding mechanism to prevent slippage from bar thrust and are diamond serrated to grip work to-

OUT OUR WAY

OH, BALONEY! YOU'RE LIVIN' IN THE OLD HORSE AN' BUGGY DAYS! A MOSSBACK OF THE OLD MUSTY MAUVE DECADE!
YEAH? WELL, IT'S THE OL' BOYS OF TH' MUSTY MAUVE THAT MADE IT POSSIBLE FER YOU TO HAVE WHUT LITTLE BRAINS YOU GOT! WHO INVENTED ALL TH' MODERN CONVENIENCES--SOME JITTERBUG LIKE YOU? HAH!
HE'S RIGHT--YOU HAD TO RIDE IN AN OX-CART TO WANT SOMETHIN' BETTER ...THIS GENERATION IS GETTIN' TOO COMFORTABLE, I THINK!
THERE'S ONE IMPROVEMENT THEY AGREE ON, THOUGH--SOL-SPEEDI-DRI! TH' BOY IS SORE BECAUSE IT WAS OLD JOE WHO FIRST THOUGHT T'SEND FOR A SAMPLE!
THE OLD AND THE NEW
J.R. WILLIAMS

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It's no accident when a product leads its field. SOL-SPEEDI-DRI is—and always has been—America's largest selling oil and grease absorbent. Big users and independent laboratories have tested it. We are constantly testing it. All factors considered, SOL-SPEEDI-DRI gives you *more for your money.* Send coupon today for free sample and brochure about how to keep *your* floors clean and slip-proof with SOL-SPEEDI-DRI!

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Warehouse stocks maintained in principal cities of the United States and Canada.

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Inquirers in New York, New England, and New Jersey should write to Speedi-Dri Corp. Elsewhere in U.S. to Waverly Petroleum Products Co., 1724 Chestnut St., Phila. 3, Pa.

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S 4-2-51

gether by holding both horizontal and rotating thrusts at an angle. Available for automatic screw machines, the tool handles all sizes and shapes of stock within capacity limits.

Check No. 11 on Reply Card for more Details

REDESIGNED LOAD CELLS: U-1 series of SR-4 universal (tension-compression) load cells, offered by Baldwin-Lima-Hamilton Corp., Philadelphia 42, Pa., are redesigned for larger scale production, more ample safety factor with overloads and higher accuracy with off-center loads. Rated load capacities are 500, 1000, 2000, 5000, 10,000 20,000 and 50,000 pounds.

Check No. 12 on Reply Card for more Details

SEVEN IN ONE: Universal steam trap, developed by Velan Engineering Co., Jersey City, N. J., combines seven devices: Steam trap, air bypass valve, check valve, self-cleaning strainer, flow control glass, temperature indicator gage and temperature control. It can be installed in any position without affecting its efficiency and in the vertical position is absolutely frost-proof. Valve is opened by steam pressure and closed by thermal action.

Check No. 13 on Reply Card for more Details

GIVES PLATED EFFECT: National Lacquer & Paint Co. Inc., Chicago 21, Ill., offers a new line of metallic bronze lacquer finishes in 15 shades. All are designed to simulate closely the appearance of plated metal. Color and reflectivity are always the same when viewed from any angle. Lacquer is noncaking, nonjelling and relatively free from settling-out difficulties.

Check No. 14 on Reply Card for more Details

ATTACHMENTS FOR SQUARES: Utility of any 9, 12, 18 or 24-inch combination square, made by L. S. Starrett Co., Athol, Mass., can be extended by a set of attachments. Set No. 289-C consists of a clamp block, scriber, 6-inch rule and 6-inch rod which are used in conjunction with attachment No. 289. No. 289 is designed to secure a steel rule or square in 90 degree relationship to the blade of a combination square.

Check No. 15 on Reply Card for more Details

THERMOSTATS: Designated as type W, a new line of snap-acting bimetal strip thermostats for use in appliances and other devices requiring sensitive precise control of high-wattage heater loads is announced by Stevens Mfg. Co., Mansfield, O. Units are available in either adjustable or non-adjustable styles with a variety of terminal arrangements. Featuring an electrically independent bimetal that eliminates artifical cycling and jitters, the units closely follow temperature of controlled device and respond rapidly to temperature changes.

Check No. 16 on Reply Card for more Details

CLUTCH COUPLING: Designed especially for installation on shafts of integral horsepower electric motors up to 15 hp rating is the new series E clutch coupling, announced by Mercury Clutch Division, Automatic Steel Products Inc., Canton, O. It is a complete unit consisting of a series E clutch with provision for mounting a standard flexible coupling between it and the driven load.

Check No. 17 on Reply Card for more Details

FOR COUNTERSINKING: Airmatic countersink, a new tool for pneumatic countersinking in all types of sheet metal, is introduced by Cleco Division, Reed Roller Bit Co., Houston 1, Texas. Utilizing a standard bayonet type countersink, it has a built-in lubricator. Mandrels for varying hole diameters and countersinks can be changed without dismantling tool. A built-in micrometer gives accurate adjustment of countersink. Made in six sizes, the device's capacity ranges from 5/16 to 5/8-inch hole diameters with metal thicknesses to 1¼ inches.

Check No. 18 on Reply Card for more Details

ELECTRIC COUNTERS: Durant Mfg. Co., Milwaukee 1, Wis., announces two new electric counters. The smaller, identified as Y, is for light applications where reading is done at close range. It will operate at speeds up to 1000 counts per minute. The CS is for heavy industrial applications and features larger figures for distant reading. Speed is up to 800 counts per minute.

Check No. 19 on Reply Card for more Details

VOLTAGE SENSITIVE RELAYS: For use in alternating circuits where a close voltage differential between relay pickup and dropout is needed, Ward Leonard Electric Co., Mount Vernon, N. Y., developed Bulletin 401 ac voltage sensitive relays, power type. A typical application is protecting alternating current motors up to 2 hp against damage caused by low line voltages.

Check No. 20 on Reply Card for more Details

INDUSTRIAL LAMPS: Two high-wattage industrial lamps with built-in reflectors for use in lighting of high-bay factories are announced by General Electric's Lamp Department, Cleveland 12, O. Produced in both 500 and 750-watt sizes, lamps employ a new bulk design, the R-52 with a special contour to distribute light downward for effective use in working areas and a cutoff to give reasonably comfortable brightness down to 35 degrees below the horizontal.

Check No. 21 on Reply Card for more Details

SUBMINIATURE CAPACITORS: Hermetically-sealed tiny threaded-neck, side stud and end stud capacitors as well as vertical and horizontal bracket mounting units are available from Sprague Electric Co., North Adams, Mass. These new mounting arrangements are intended to help equipment designers overcome vibration and shock problems encountered when mounting capacitors by wire leads in military gear.

Check No. 22 on Reply Card for more Details

PLUG-IN CIRCUIT BREAKER: A new plug-in type circuit breaker for 15 to 50 amp services, featuring quick-make, quick-break operation and thermal magnetic protection is introduced by Trumbull Electric Mfg. Co., Plainville, Conn., for application in a new line of load centers and panelboards. It incorporates a strong main operating spring which takes the action out of the hands of the operator once handle has been moved.

Check No. 23 on Reply Card for more Details

MINIMIZE CLUTCH WEAR: A new caster for industrial handling equipment, introduced by Aerol Co., Burbank, Calif., is cast from prime aluminum alloy and is designed to minimize clutch wear, battery strain and mechanical fatigue on power towing equipment. Maintenance problems are simplified by use of a permanently adjusted king pin of 1¼-inch chrome molybdenum. Special lubricants are sealed in hub and caster rig at factory.

Check No. 24 on Reply Card for more Details

FOR MORE INFORMATION

on the new products and equipment in this section, fill in a card. It will receive prompt attention.

Helpful Literature

74. Organic Solvents

Central Solvents & Chemicals Co.—64-page booklet "Organic Solvents" explains in nontechnical language the properties and applications of solvents which contain carbon. Tables of properties are included on hydrocarbon solvents, alcohols, esters, ketones and chlorinated solvents.

75. Power Lift Truck

Erickson Power Lift Trucks Inc.—8-page illustrated bulletin "The Workhorse of Lift Trucks" describes platform, fork and custom model lift trucks with capacities ranging from 5000 to 16,000 lb. Various types of materials handling accessories which diversify applications of these machines are listed.

76. Grinding With Inspection

Cleveland Grinding Machine Co.—4-page illustrated bulletin depicts some of operations performed with Visual-Grind contour grinding machine equipped with apparatus for continuous inspection. Machine, with 6 x 14 x 8-in. capacity, is offered with six lens magnifications.

77. Shop Barrow

American Conveyor Co.—Illustrated data sheet tells how model G-12 and D-12 Speed-Barrows can be used in warehouses and manufacturing plants to handle material with minimum of effort and manpower. Specifications of pneumatic-tired equipment are given.

78. Contract Drilling & Boring

Conner Tool & Cutter Co.—4-page illustrated bulletin outlines techniques, facilities and types of work that are involved in deep hole contract drilling and boring. Typical parts requiring deep hole drilling include three-piece cam shafts, airplane struts and gun barrels.

79. Conveyor Chain

Chain Belt Co.—4-page illustrated bulletin No. 51-59 deals with Rex Flex Top conveyor chain that can flex in two planes and curve around sharp corners with ease. Because of its design, chain conveyor eliminates need for transferring containers from one conveyor to another.

80. Adhesive Metal Tags

C & H Supply Co., Metal-Cal Div.—Advantages, limitations, usages and method of application of Metal-Cal permanent identification device are found in brochure. Made of 0.003-in. aluminum foil, anodized and dyed to specification and backed with bonding material, they can be applied to any smooth, cohesive surface.

81. Stainless Steel Processing

Armco Steel Corp.—40-page illustrated manual "Heat Treating and Pickling of Armco Stainless Steels" traces every phase of subject including practice and equipment, preparation, annealing, stress relieving, pickling, tempering and special procedures. Stainless types covered include chromium-nickel, ferritic chromium and martensitic chromium. Complete engineering data are presented.

82. Water Demineralizer

Penfield Mfg. Co.—6-page illustrated folder describes new permanent cartridge type demineralizer for laboratories and other users of up to 10 gpm of high purity water. Units operate on ion exchange principle and feature replaceable cartridge.

83. Wire Specialties

E. H. Titchener & Co.—6-page illustrated pocket-size folder contains information on design and production of wire forms, welded wire assemblies, wire and strip metal assemblies and light stampings. Company's facilities for subcontract work and regular production are covered also.

84. Mill Motors

Westinghouse Electric Corp.—20-page illustrated booklet B-4730 describes 600-series mill motors and Class 9500 direct current magnetic auxiliary controllers. Controllers use type M contactor which is available in NEMA ratings from 25 to 2500 amp.

85. Cutting Oil

Gulf Oil Corp.—6-page illustrated folder describes advantages resulting from use of improved Lasupar cutting oil which contains active free sulphur held in stable solution. Offered in three grades, oil was developed for heavy machining where fine finishes are required.

86. Tank Level Control

Automatic Control Co.—4-page illustrated bulletin No. 1100 describes Autocon Tanktrols for operating pumps by pressure changes at predetermined high or low tank levels. Twin bellows individually control high and low levels. Available in open chassis, standard water tight, dust tight and hazardous types, easily-adjusted unit can be used on primary, booster and sprinkler systems.

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HELPFUL LITERATURE

87. Finned Tubes

Brown Fintube Co.—8-page illustrated bulletin No. 511 describes construction of integral extended surface Fintubes and lists range of sizes and materials in which they are available. Engineering data includes design curves and tabulation showing comparative outside surface areas provided by different sizes of bare pipe and longitudinally finned pipe or tubing.

88. Fork Trucks

Baker-Raulang Co., Baker Industrial Truck Div.—8-page illustrated specification bulletin No. 1325 contains general information, dimension drawings and application data on model FT-60 6000-lb capacity fork lift truck. Amount of time needed for maintaining major components and descriptions of 14 special attachments are included.

89. Salt Bath Brazing Process

Ajax Electric Co.—4-page illustrated bulletin No. 124 is descriptive of salt bath brazing process for brazing steel, cast iron, brass, copper and aluminum assemblies. In this process, it is possible to substitute brass for copper and develop joints of adequate strength for most steel assemblies.

90. Rust Prevention

Angler Corp.—24-page illustrated brochure depicts and discusses industrial applications of VPI Wrap vapor method of rust prevention. Included is short history of product's development and its use in impregnating kraft paper wrappings.

91. Space Heater

Dravo Corp.—8-page illustrated bulletin No. 526 describes Counterflo direct fired space heaters in gas or oil fired models with outputs ranging from 400,000 to 2,000,000 Btu per hour.

92. Barrel Finishing Compounds

Queen Stove Works, Inc., Almco Div. — 12-page illustrated bulletin "Supersheen" gives properties and applications of various types of abrasive media and compounds developed especially for use in barrel finishing operations.

93. Strain Gage Indicator

Cole Instrument Co.—1-page illustrated data sheet contains complete details on six-channel strain gage indicator which permits rapid readings of up to six resistance wire strain gages which can be attached to various parts of complex structures.

94. Metal Bellows

Chicago Metal Hose Corp.—16-page illustrated catalog CMH-113 is descriptive of various types of Flexon metal bellows that can be obtained in brass, stainless steel, bronze, Monel and Inconel in single and multiple ply construction. They are suitable for control devices and instrumentation such as regulators, valves, steam traps, shaft seals and expansion connectors.

95. Dielectric Constant Meter

Eberbach & Son Co.—1-page illustrated bulletin 280 deals with easy-to-operate instrument which measures dielectric constant of liquids and demonstrates principles related to this property.

96. Vibration Isolation

Felters Co.—16-page illustrated booklet "Unisorb" describes how this material simplifies anchoring of machines on all types of floors and controls transmitted vibration and noise. Use of cemented pads for mounting textile, air conditioning and other machines; compressors and pumps; machine tools and many other types of equipment are described.

97. Air & Gas Filters

Dollinger Corp.—8-page illustrated bulletin describes, illustrates and gives applications and specifications for 75 Staynew pipe line filters for air and other gases. Making use of mechanical separation and filtration, series 600 filters are for air pressure up to 6000 psi. Also shown are vacuum, adsorption and special types.

98. Metal Turnings Crusher

American Pulverizer Co.—8-page illustrated bulletin discusses value of crushed turnings in oil reclamation and scrap sale. It shows how to convert long metal turnings into profitable commodity and describes features, design and construction of various types of crushers.

99. Armed Service Finishes

Glidden Co.—4-page illustrated folder "For Quick Conversion to Defense Production" outlines how company 'know-how' can help those converting to armed service goods production requiring government specification finishes.

100. Reproduction Equipment

Charles Bruning Co.—8-page illustrated bulletin A-1081 describes applications of Copyflex copying machines which reduce paper work in sales, production, research, personnel, office and accounting operations. Five models of Diazo type black and white reproduction machines are available to suit any requirement.

FOR MORE INFORMATION USE ONE OF THESE CARDS . .

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7	27	47	67	87
8	28	48	68	88
9	29	49	69	89
10	30	50	70	90
11	31	51	71	91
12	32	52	72	92
13	33	53	73	93
14	34	54	74	94
15	35	55	75	95
16	36	56	76	96
17	37	57	77	97
18	38	58	78	98
19	39	59	79	99
20	40	60	80	100

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The Market Outlook

CIVILIAN steel tonnage is being increasingly crowded from mill order books under pressure of mounting defense demands. Rated orders are accelerating steadily. Mill delivery promises on such account now generally fall in third quarter. On certain specialties mills are committed well into fourth quarter. Meanwhile, tonnage set-asides for defense programs are growing and the confusion attending diversion of more and more steel from regular commercial consuming channels is intensifying in a tangle of directives, priorities and allocations.

DIRECTIVES—Defense programs for June are now being set up. These will be the same as those established for May, but, it is understood, they will necessitate an overall increase in allocations running to at least 43,000 tons. The programs will carry the same DO numbers that apply for May. Scheduling procedure, on which point producers have been somewhat confused as result of placing all programs on a DO-rated basis, is expected to be pretty much determined by that time.

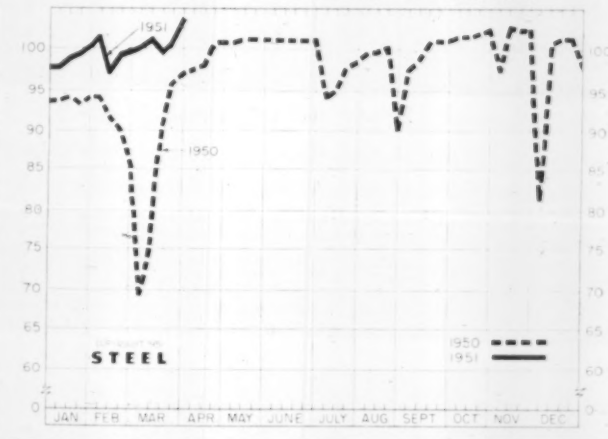
SET-ASIDES—To meet heavier DO requirements, minimum tonnage percentages which the steelmakers must set aside for defense programs have been increased on several items. This is the second time within a month that the National Production Authority has increased set-asides. Its latest action upped the set-aside on heavy carbon structurals 10 points to 30 per cent and on piling 15 points to 30. Also, a set-aside of 5 per cent of production was established for cold-drawn alloy strip, hitherto not under quota. In mid-March set-asides were increased on a much larger number of products.

MRO ORDERS—Deluge of DO-97 orders for maintenance and repairs has so swamped the steelmakers steps have been taken to eliminate the resulting confusion in steel mill order departments. Pending clarification of regulation No. 4, covering DO-97 rated orders, the steel mills can defer action on all such rated MRO requirements as may be involved in directive programs. They are taking no action on such orders scheduled for production and shipment in April and May. For June, steelmakers must refer to Washington tonnage orders which may appear excessive. In effect, it appears DO-97 orders are out of the picture until June on directive programs and that on orders from that time on sellers must do a certain amount of policing. Clarification of the regulation is expected soon. One proposal is to establish railroad maintenance and repairs in a separate classification.

PRICES—Ceiling schedules are being maintained in all sections of the steel and related markets. Adjustments are to be expected from time to time, however, as indicated by last week's increase in scrap prices at Detroit, allowed by the stabilization authorities to remove an incongruity in the price schedule. Additional scrap schedule adjustments are anticipated to eliminate certain irregular practices which have been uncovered, such as upgrading. STEEL's price composites are unchanged with the weighted index on finished steel 171.92, the arithmetical finished steel composite $106.32, No. 2 foundry pig iron, $52.54, basic pig iron, $52.16, malleable pig iron, $53.27, and steelmaking scrap $44. Effect of the 4 per cent increase in freight rates will be reflected in delivered prices this week.

PRODUCTION—The steel mills scheduled production of a record tonnage last week, output for the week being estimated at 2,069,000 net tons. This compares with the previous weekly high of 2,025,000 tons in the week ended Feb. 3. The national ingot rate rose 3 points last week to 103.5 per cent of capacity. The gain was due chiefly to resumption of operations at Jones & Laughlin Steel Corp.'s Pittsburgh works which had been closed down by a plant railroad labor dispute. Pittsburgh district operations rose 9 points to 100 per cent.

NATIONAL STEELWORKS OPERATIONS



DISTRICT INGOT RATES

Percentage of Capacity Engaged at Leading Production Points

	Week Ended Mar. 31	Change	Same Week 1950	Same Week 1949
Pittsburgh	100	9*	99.5	98.5
Chicago	105.5	1.5*	101	99.5
Mid-Atlantic	100.5	0	89	91.5
Youngstown	103	1	100	101
Wheeling	96	1	102.5	96.5
Cleveland	101.5	2*	97	103
Buffalo	104	0	104	104
Birmingham	100	0	100	100
New England	81	1	81	88
Cincinnati	101	0	97	102
St. Louis	93	2	91	92.5
Detroit	106	4.5*	107	104
Western	102	0	95	99.5
Estimated national rate	103.5	3	97	100

Based on weekly steelmaking capacity of 1,999,034 tons for 1951; 1,928,721 tons for second half, 1950; 1,906,268 tons for first half, 1950; 1,843,516 tons for 1949.

*Change from revised rate for preceding week.

The Metalworking Outlook—p. 41 Production-Engineering News—p. 77

Composite Market Averages

	Mar. 29 1951	Week Ago	Month Ago	Year Ago	5 Yrs. Ago
FINISHED STEEL INDEX, Weighted:					
Index (1935-39 av. 100)	171.92	171.92	171.92	156.13	111.62
Index in cents per lb.	4.657	4.657	4.657	4.230	3.024
ARITHMETICAL PRICE COMPOSITES:					
Finished Steel, NT	$106.32	$106.32	$106.32	$93.18	$63.54
No. 2 Fdry. Pig Iron, GT	52.54	52.54	52.54	46.47	25.42
Basic Pig Iron, GT	52.16	52.16	52.16	45.97	24.75
Malleable Pig Iron, GT	53.27	53.27	53.27	47.27	26.04
Steelmaking Scrap, GT	44.00	44.00	44.00	27.50	19.17

Weighted finished steel index based on average shipments and Pittsburgh district prices of the following 14 representative products during 5-year base period 1935-39: Structural shapes, plates, rails, hot-rolled and cold-finished bars, pipe, wire, nails, tin plate, hot and cold-rolled sheets, galvanized sheets, hot and cold-rolled strip. For complete explanation see STEEL, Sept. 19, 1949, p. 54.

Arithmetical steel price composite based on same products as the weighted finished steel index with the exception of rails, cold-finished bars, galvanized sheets and hot-rolled strip.

Basic and No. 2 foundry pig iron composites are based on average prices at Pittsburgh, Bethlehem, Birmingham, Buffalo, Chicago, Cleveland, Granite City, Youngstown. Malleable composite based on same points, except Birmingham.

Steelmaking scrap composite based on average prices of No. 1 heavy melting steel at Pittsburgh, Chicago and Philadelphia.

Comparison of Prices

Comparative prices by districts, in cents per pound except as otherwise noted. Delivered prices based on nearest production point.

FINISHED MATERIALS

	Mar. 29 1951	Week Ago	Month Ago	Year Ago	5 Yrs. Ago
Bars, H.R., Pittsburgh	3.70	3.70	3.70	3.45	2.50
Bars, H.R., Chicago	3.70	3.70	3.70	3.45	2.50
Bar, H.R., del. Philadelphia	4.18	4.18	4.18	3.93	2.82
Bars, C.F., Pittsburgh	4.55	4.55	4.55	4.10-15	3.10
Shapes, Std., Pittsburgh	3.65	3.65	3.65	3.40	2.35
Shapes, Std., Chicago	3.65	3.65	3.65	3.40	2.35
Shapes, del. Philadelphia	3.90	3.90	3.90	3.46	2.465
Plates, Pittsburgh	3.70	3.70	3.70	3.50	2.50
Plates, Chicago	3.70	3.70	3.70	3.50	2.50
Plates, Coatesville, Pa.	4.15	4.15	4.15	3.60	2.50
Plates, Sparrows Point, Md.	3.70	3.70	3.70	3.50	2.50
Plates, Claymont, Del.	4.15	4.15	4.15	3.60	2.50
Sheets, H.R., Pittsburgh	3.60-75	3.60-75	3.60-75	3.35	2.425
Sheets, H.R., Chicago	3.60	3.60	3.60	3.35	2.425
Sheets, C.R., Pittsburgh	4.35	4.35	4.35	4.10	3.275
Sheets, C.R., Chicago	4.35	4.35	4.35	4.10	3.275
Sheets, C.R., Detroit	4.55	4.55	4.55	4.30	3.375
Sheets, Galv., Pittsburgh	4.80	4.80	4.80	4.40	4.05
Strip, H.R., Pittsburgh	3.75-4.00	3.75-4.00	3.75-4.00	3.25	2.35
Strip, H.R., Chicago	3.50	3.50	3.50	3.25	2.35
Strip, C.R., Pittsburgh	4.65-5.35	4.65-5.35	4.65-5.35	4.15	3.05
Strip, C.R., Chicago	4.90	4.90	4.90	4.30	3.15
Strip, C.R., Detroit	4.35-5.60	4.35-5.60	4.35-5.60	4.35-40	3.15
Wire, Basic, Pittsburgh	4.85-5.10	4.85-5.10	4.85-5.10	4.50	3.05
Nails, Wire, Pittsburgh	5.90-6.20	5.90-6.20	5.90-6.20	5.30	3.25
Tin plate, box, Pittsburgh	$8.70	$8.70	$8.70	$7.50	$5.25

SEMIFINISHED

Billets, forging, Pitts. (NT)	$66.00	$66.00	$66.00	$63.00	$47.00
Wire rods, $\frac{7}{32}$-$\frac{3}{8}$", Pitts.	4.10-30	4.10-30	4.10-30	3.85	2.30

PIG IRON, Gross Ton

Bessemer, Pitts.	$53.00	$53.00	$53.00	$47.00	$27.00
Basic, Valley	52.00	52.00	52.00	46.00	26.00
Basic, del. Phila.	56.39	56.39	56.39	49.44	27.84
No. 2 Fdry, Pitts.	52.50	52.50	52.50	46.50	26.50
No. 2 Fdry, Chicago	52.50	52.50	52.50	46.50	26.50
No. 2 Fdry, Valley	52.50	52.50	52.50	46.50	26.50
No. 2 Fdry, Del. Phila.	56.89	56.89	56.89	49.94	28.34
No. 2 Fdry, Birm.	48.88	48.88	48.88	42.38	22.88
No. 2 Fdry (Birm.)del. Cin.	55.58	55.58	55.58	49.08	26.56
Malleable Valley	52.50	52.50	52.50	46.50	26.50
Malleable, Chicago	52.50	52.50	52.50	46.50	26.50
Charcoal, Lyles, Tenn.	66.00	66.00	66.00	60.00	33.00
Ferromanganese, Etna, Pa.	188.00	188.00	188.00	175.00	140.00*

* Delivered, Pittsburgh.

SCRAP, Gross Ton (including broker's commission)

No. 1 Heavy Melt. Pitts.	$45.00	$45.00	$45.00	$32.00	$20.00
No. 1 Heavy Melt. E. Pa.	43.50	43.50	43.50	25.25	18.75
No. 1 Heavy Melt. Chicago	43.50	43.50	43.50	29.00	18.75
No. 1 Heavy Melt. Valley	45.00	45.00	45.00	32.75	20.00
No. 1 Heavy Melt. Cleve.	44.00	44.00	44.00	29.25	19.50
No. 1 Heavy Melt. Buffalo	44.00	44.00	44.00	28.25	19.25
Rails, Rerolling, Chicago	52.50	52.50	52.50	45.50	22.25
No. 1 Cast, Chicago	49.00*	49.00*	49.00*	42.50	20.00

* F.o.b. shipping point.

COKE, Net Ton

Beehive, Furn., Connlsvl.	$14.75	$14.75	$14.75	$14.25	$7.50
Beehive, Fdry., Connlsvl.	17.50	17.50	17.50	16.00	8.25
Oven, Fdry., Chicago	21.00	21.00	21.00	21.00	13.00

NONFERROUS METALS

Copper, del. Conn.	24.50	24.50	24.50	18.50	12.00
Zinc, E. St. Louis	17.50	17.50	17.50	10.25	8.25
Lead, St. Louis	16.80	16.80	16.80	10.30	6.35
Tin, New York	146.00	134.00	181.50	76.50	52.00
Aluminum, del.	19.00	19.00	19.00	17.00	15.00
Antimony, Laredo, Tex.	42.00	42.00	42.00	24.50	14.50
Nickel, refinery, duty paid	50.50	50.50	50.50	40.00	35.00

Pig Iron

F.o.b. furnace prices quoted under GCPR as reported to STEEL. Minimum delivered prices do not include 3% federal tax. Key to producing companies published on second following page.

PIG IRON, Gross Ton

	Basic	No. 2 Foundry	Malleable	Bessemer
Bethlehem, Pa., B2	$54.00	$54.50	$55.00	$59.00
Brooklyn, N.Y., del.	....	58.79	59.29	....
Newark, del.	56.63	57.13	57.63	59.13
Philadelphia, del.	56.39	56.89	57.39	57.89
Birmingham District				
Alabama City, Ala. R2	48.38	48.88	....	....
Birmingham R2	48.38	48.88	....	....
Birmingham S9	48.38	48.88	....	....
Woodward, Ala. W15	48.38	48.88	....	....
Cincinnati, del.	....	55.58	....	....
Buffalo District				
Buffalo R2	52.00	52.50	53.00	....
Buffalo H1	52.00	52.50	53.00	....
Tonawanda, N.Y. W12	52.00	52.50	53.00	....
No. Tonawanda, N.Y. T9	....	52.50	53.00	....
Boston, del.	61.26	61.76	62.20	....
Rochester, N.Y., del.	54.63	55.13	55.63	....
Syracuse, N.Y., del.	55.58	56.08	56.58	....
Chicago District				
Chicago I-3	52.00	52.50	52.50	53.00
Gary, Ind. U5	52.00	....	52.50	....
Indiana Harbor, Ind. I-2	52.00	....	52.50	....
So. Chicago, Ill. W14	52.00	52.50	52.50	....
So. Chicago, Ill. Y1	52.00	52.50	52.50	....
So. Chicago, Ill. U5	52.00	....	52.50	53.00
Milwaukee, del.	53.89	54.39	54.39	54.89
Muskegon, Mich., del.	....	57.98	57.98	....
Cleveland District				
Cleveland A7	52.00	52.50	52.50	53.00
Cleveland R2	52.00	52.50	52.50	....
Akron, del. from Cleve.	54.39	54.89	54.89	54.39
Lorain, O. N3	52.00	....	....	53.00
Duluth I-3	....	....	52.50	....
Erie, Pa. I-3	52.00	52.50	52.50	53.00
Everett, Mass. E1	....	53.25	53.75	....
Fontana, Calif. K1	58.00	58.50	....	....
Geneva, Utah G1	52.00	52.50	....	....
Seattle, Tacoma, Wash., del.	....	60.20	....	....
Portland, Oreg., del.	....	60.20	....	....
Los Angeles, San Francisco, del.	59.70	60.20	....	....
Granite City, Ill. G4	53.90	54.40	54.90	....
St. Louis, del. (inc. tax)	54.65	55.15	55.65	....
Ironton, Utah C11	52.00	52.50	....	....
Lone Star, Tex. L6	48.00	*48.50	48.50	....
Minnequa, Colo. C10	54.00	53.00	55.00	....
Pittsburgh District				
Neville Island, Pa. P6	....	52.50	52.50	53.00
Pitts., N.&S. sides, Ambridge, Aliquippa, del.	....	53.69	53.69	54.19
McKees Rocks, del.	....	53.45	53.45	53.95
Lawrenceville, Homestead, McKeesport, Monaca, del.	....	53.94	53.94	54.44
Verona, del.	....	54.40	54.40	54.90
Brackenridge, del.	....	54.63	54.63	55.13
Bessemer, Pa. U5	52.00	....	52.50	53.00
Clairton, Rankin, So. Duquesne, Pa. U5	52.00	....	....	....
McKeesport, Pa. N3	52.00	....	....	53.00
Monessen, Pa. P7	54.00	....	....	....
Sharpsville, Pa. S6	....	....	52.50	53.00
Steelton, Pa. B2	54.00	54.50	55.00	55.50
Swedeland, Pa. A3	56.00	56.50	57.00	57.50
Toledo, O. I-3	52.00	52.50	52.50	53.00
Cincinnati, del.	57.01	57.51	....	....
Troy, N.Y. R2	54.00	54.50	55.00	55.50
Youngstown District				
Hubbard, O. Y1	52.00	52.50	52.50	....
Youngstown Y1	52.00	52.50	52.50	....
Youngstown U5	52.00	....	....	53.00
Mansfield, O., del.	56.26	56.76	56.76	57.26

* Low phos, southern grade.

PIG IRON DIFFERENTIALS

Silicon: Add 50 cents per ton for each 0.25% Si over base grade, 1.75-2.25%.

Phosphorus: Deduct 38 cents per ton for P content of 0.70% and over.

Manganese: Add 50 cents per ton for each 0.50% manganese over 1%, or portion thereof.

Nickel: Under 0.50% no extra; 0.50-0.74%, incl., add $2 per ton and each additional 0.25%, add $1 per ton.

BLAST FURNACE SILVERY PIG IRON, Gross Ton

(Base 6.00-6.50% silicon; add $1.50 for each 0.5% Si)

Jackson, O. G2, J1	$82.50
Buffalo H1	83.75

ELECTRIC FURNACE SILVERY PIG IRON, Gross Ton

(Base 14.01-14.50% silicon; add $1 for each 0.5% Si to 18%; $1 for each 0.5% Mn over 1%; $1 for each 0.045% max. P)

Niagara Falls, N.Y. P15	$83.00
Keokuk, Iowa, Openhearth & Fdry. frt. allowed K2	92.50
Keokuk, OH & Fdry., 12½ lb piglets, 16% Si, frt. allowed K2	95.50
Wenatchee, Wash., O.H. & Fdry., frt. allowed K2	92.50

CHARCOAL PIG IRON, Gross Ton

(Low phos, semi-cold blast; differential charged for silicon over base grade; also for hard chilling iron Nos. 5 & 6)

Lyles, Tenn. T3	$66.00

LOW PHOSPHOROUS PIG IRON, Gross Ton

Cleveland, intermediate, A7	$57.00
Steelton, Pa. B2	60.00
Philadelphia delivered	63.00
Troy, N.Y. R2	60.00

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Semifinished and Finished Steel Products

Mill prices quoted under GCPR as reported to STEEL, Mar. 29, 1951; cents per pound except as otherwise noted. Changes shown in italics. Code numbers following mill points indicate producing company; key on next two pages.

INGOTS, Carbon, Forging (NT)
Alameda,Calif. K1 ... $79.00
Munhall,Pa. U5 ... 52.00

INGOTS, Alloy (NT)
Detroit R7 ... $54.00
Fontana,Calif. K1 ... 80.00
Houston,Tex. S5 ... 62.00
Midland,Pa. C18 ... 54.00
Munhall,Pa. U5 ... 54.00

BILLETS, BLOOMS & SLABS
Carbon, Rerolling (NT)
Bessemer,Pa. U5 ... $56.00
Clairton,Pa. U5 ... 56.00
Ensley,Ala. T2 ... 56.00
Fairfield,Ala. T2 ... 56.00
Fontana,Calif. K1 ... 75.00
Gary,Ind. U5 ... 56.00
Johnstown,Pa. B2 ... 56.00
Lackawanna,N.Y. B2 ... 56.00
Munhall,Pa. U5 ... 56.00
So.Chicago,Ill. U5 ... 56.00
So.Duquesne,Pa. U5 ... 56.00

Carbon, Forging (NT)
Bessemer,Pa. U5 ... $66.00
Buffalo R2 ... 66.00
Canton,O. R2 ... 66.00
Clairton,Pa. U5 ... 66.00
Cleveland R2 ... 66.00
Conshohocken,Pa. A3 ... 73.00
Detroit R7 ... 69.00
Ensley,Ala. T2 ... 66.00
Fairfield,Ala. T2 ... 66.00
Fontana,Calif. K1 ... 85.00
Gary,Ind. U5 ... 66.00
Geneva,Utah G1 ... 66.00
Houston,Tex. S5 ... 74.00
Johnstown,Pa. B2 ... 66.00
Lackawanna,N.Y. B2 ... 66.00
LosAngeles B3 ... 85.00
Munhall,Pa. U5 ... 66.00
Seattle B3 ... 85.00
So.Chicago R2, U5, W14 ... 66.00
So.Duquesne,Pa. U5 ... 66.00
So.SanFrancisco B3 ... 85.00

Alloy, Forging (NT)
Bethlehem,Pa. B2 ... $76.00
Buffalo R2 ... 70.00
Canton,O. R2 ... 70.00
Canton,O.(29) T7 ... 66.00
Conshohocken,Pa. A3 ... 77.00
Detroit R7 ... 73.00
Fontana,Calif. K1 ... 89.00
Gary,Ind. U5 ... 70.00
Houston,Tex. S5 ... 78.00
Ind.Harbor,Ind. Y1 ... 70.00
Johnstown,Pa. B2 ... 70.00
Lackawanna,N.Y. B2 ... 70.00
LosAngeles B3 ... 90.00
Massillon,O. R2 ... 70.00
Midland,Pa. C18 ... 70.00
Munhall,Pa. U5 ... 70.00
So.Chicago R2,U5,W14 ... 70.00
So.Duquesne,Pa. U5 ... 70.00
Struthers,O. Y1 ... 70.00
Warren,O. C17 ... 70.00

ROUNDS, SEAMLESS TUBE (NT)
Canton,O. R2 ... $82.00
Cleveland R2 ... 82.00
Fontana,Calif. K1 ... 103.00
Gary,Ind. U5 ... 82.00
Massillon,O. R2 ... 82.00
So.Chicago,Ill. R2 ... 82.00
So.Duquesne,Pa. U5 ... 82.00

SHEET BARS (NT)
Fontana,Calif. K1 ... $89.00

SKELP
Aliquippa,Pa. J5 ... 3.45
Munhall,Pa. U5 ... 3.35
Warren,O. R2 ... 3.35
Youngstown R2, U5 ... 3.35

WIRE RODS
AlabamaCity,Ala. R2 ... 4.10
Buffalo W12 ... 4.10
Cleveland A7 ... 4.10
Donora,Pa. A7 ... 4.10
Fairfield,Ala. T2 ... 4.10
Fontana,Calif. K1 ... 4.90
Houston,Tex. S5 ... 4.50
Johnstown,Pa. B2 ... 4.10
Joliet,Ill. A7 ... 4.10
LosAngeles B3 ... 4.90
Minnequa,Colo. C10 ... 4.35
Monessen,Pa. P7 ... 4.30
No.Tonawanda,N.Y. B11 ... 4.10
Pittsburg,Calif. C11 ... 4.75
Portsmouth,O. P12 ... 4.30
Roebling,N.J. R5 ... 4.20
So.Chicago,Ill. R2 ... 4.10
SparrowsPoint,Md. B2 ... 4.20
Sterling,Ill.(1) N15 ... 4.10
Struthers,O. Y1 ... 4.10
Torrance,Calif. C11 ... 4.90
Worcester A7 ... 4.40

PLATES, Wrought Iron
Economy,Pa. B14 ... 8.60

STRUCTURALS
Carbon Steel Stand. Shapes
AlabamaCity,Ala. R2 ... 3.60
Aliquippa,Pa. J5 ... 3.65
Bessemer,Ala. T2 ... 3.65
Bethlehem,Pa. B2 ... 3.70
Clairton,Pa. U5 ... 3.65
Fairfield,Ala. T2 ... 3.65
Fontana,Calif. K1 ... 4.25
Gary,Ind. U5 ... 3.65
Geneva,Utah G1 ... 3.65
Houston,Tex. S5 ... 4.05
Ind.Harbor,Ind. I-2 ... 3.65
Johnstown,Pa. B2 ... 3.70
KansasCity,Mo. S5 ... 4.25
Lackawanna,N.Y. B2 ... 3.70
LosAngeles B3 ... 4.25
Minnequa,Colo. C10 ... 4.10
Munhall,Pa. U5 ... 3.65
Niles,Calif.(22) P1 ... 4.85
Phoenixville,Pa. P4 ... 4.95
Portland,Oreg. O4 ... 4.50
Seattle B3 ... 4.30
So.Chicago,Ill. U5, W14 ... 3.65
So.SanFrancisco B3 ... 4.20
Torrance,Calif. C11 ... 4.25
Weirton,W.Va. W6 ... 3.90

Alloy Stand. Shapes
Clairton,Pa. U5 ... 4.35
Fontana,Calif. K1 ... 5.55
Munhall,Pa. U5 ... 4.35
So.Chicago,Ill. U5 ... 4.35

H.S., L.A. Stand. Shapes
Aliquippa,Pa. J5 ... 5.50
Bessemer,Ala. T2 ... 5.50
Bethlehem,Pa.(14) B2 ... 5.50
Clairton,Pa. U5 ... 5.50
Fairfield,Ala. T2 ... 5.50
Fontana,Calif. K1 ... 6.10
Gary,Ind. U5 ... 5.50
Geneva,Utah G1 ... 5.50
Ind.Harbor,Ind. I-2 ... 5.50
Ind.Harbor,Ind. Y1 ... 6.00
Johnstown,Pa. B2 ... 5.50
Lackawanna,N.Y.(14) B2 ... 5.50
LosAngeles B3 ... 6.05
Munhall,Pa. U5 ... 5.50
Seattle B3 ... 6.10
So.Chicago,Ill. U5 ... 5.50
So.SanFrancisco B3 ... 6.00
Struthers,O. Y1 ... 6.00

Wide Flange
Bethlehem,Pa. B2 ... 3.70
Clairton,Pa. U5 ... 3.65
Fontana,Calif. K1 ... 4.65
Lackawanna,N.Y. B2 ... 3.70
Munhall,Pa. U5 ... 3.65
So.Chicago,Ill. U5 ... 3.65

H.S., L.A. Wide Flange
Bethlehem,Pa. B2 ... 5.50
Lackawanna,N.Y. B2 ... 5.50
Munhall,Pa. U5 ... 5.45
So.Chicago,Ill. U5 ... 5.45

SHEET STEEL PILING
Ind.Harbor,Ind. I-2 ... 4.45
Lackawanna,N.Y. B2 ... 4.45
Munhall,Pa. U5 ... 4.45
So.Chicago,Ill. U5 ... 4.45

BEARING PILES
Munhall,Pa. U5 ... 3.65
So.Chicago,Ill. U5 ... 3.65

PLATES, High-Strength Low-Alloy
Aliquippa,Pa. J5 ... 5.65
Bessemer,Ala. T2 ... 5.65
Clairton,Pa. U5 ... 5.65
Cleveland J5, R2 ... 5.65
Conshohocken,Pa. A3 ... 5.90
Fairfield,Ala. T2 ... 5.65
Fontana,Calif.(30) K1 ... 6.25
Gary,Ind. U5 ... 5.65
Geneva,Utah G1 ... 5.65
Ind.Harbor,Ind. I-2 ... 5.65
Ind.Harbor,Ind. Y1 ... 6.15
Johnstown,Pa. B2 ... 5.65
Munhall,Pa. U5 ... 5.65
Pittsburgh J5 ... 5.65
Seattle B3 ... 6.55
Sharon,Pa. S3 ... 5.70
So.Chicago,Ill. U5 ... 5.65
SparrowsPoint,Md. B2 ... 5.65
Warren,O. R2 ... 5.65
Youngstown Y1 ... 6.15

PLATES, Open-Hearth Alloy
Claymont,Del. C22 ... 4.85
Coatesville,Pa. L7 ... 5.25
Conshohocken,Pa. A3 ... 5.05
Fontana,Calif. K1 ... 5.70
Gary,Ind. U5 ... 4.75
Johnstown,Pa. B2 ... 4.75
Munhall,Pa. U5 ... 4.75
Sharon,Pa. S3 ... 5.20
So.Chicago,Ill. U5 ... 4.75
SparrowsPoint,Md. B2 ... 4.75

FLOOR PLATES
Cleveland J5 ... 4.75
Conshohocken,Pa. A3 ... 4.75
Harrisburg,Pa. C5 ... 5.95
Ind.Harbor,Ind. I-2 ... 4.75
Munhall,Pa. U5 ... 4.75
So.Chicago,Ill. U5 ... 4.75

PLATES, Carbon Steel
AlabamaCity,Ala. R2 ... 3.70
Aliquippa,Pa. J5 ... 3.70
Ashland,Ky.(15) A10 ... 3.70
Bessemer,Ala. T2 ... 3.70
Clairton,Pa. U5 ... 3.70
Claymont,Del. C22 ... 4.15
Cleveland J5, R2 ... 3.70
Coatesville,Pa. L7 ... 4.15
Conshohocken,Pa. A3 ... 4.15
Fairfield,Ala. T2 ... 3.70
Fontana,Calif.(30) K1 ... 4.30
Gary,Ind. U5 ... 3.70
GraniteCity,Ill. G4 ... 4.40
Geneva,Utah G1 ... 3.70
Harrisburg,Pa. C5 ... 4.95
Houston,Tex. S5 ... 4.10
Ind.Harbor,Ind. I-2, Y1 ... 3.70
Johnstown,Pa. B2 ... 3.70
Lackawanna,N.Y. B2 ... 3.70
Minnequa,Colo. C10 ... 4.50
Munhall,Pa. U5 ... 3.70
Pittsburgh J5 ... 3.70
Seattle B3 ... 4.60
Sharon,Pa. S3 ... 3.95
So.Chicago,Ill. U5, W14 ... 3.70
SparrowsPoint,Md. B2 ... 3.70
Steubenville,O. W10 ... 3.70
Warren,O. R2 ... 3.70
Weirton,W.Va. W6 ... 4.00
Youngstown R2, U5, Y1 ... 3.70

PLATES, Carbon A. R.
Fontana,Calif. K1 ... 5.45
Geneva,Utah G1 ... 4.85

PLATES, Ingot Iron
Ashland,c.l.(15) A10 ... 3.95
Ashland,lcl.(15) A10 ... 4.45
Cleveland,c.l. R2 ... 4.30
Warren,O. c.l. R2 ... 4.30

BARS, Hot-Rolled Carbon
AlabamaCity,Ala. R2 ... 3.70
Aliquippa,Pa. J5 ... 3.70
Alton,Ill.(1) L1 ... 3.95
Atlanta,Ga. A11 ... 4.25
Bessemer,Ala. T2 ... 3.70
Buffalo R2 ... 3.70
Canton,O. R2 ... 3.70
Clairton,Pa. U5 ... 3.70
Cleveland R2 ... 3.70
Detroit R7 ... 3.85
Emeryville,Calif. J7 ... 4.45
Fairfield,Ala. T2 ... 3.70
Fontana,Calif. K1 ... 4.40
Gary,Ind. U5 ... 3.70
Houston,Tex. S5 ... 4.10
Ind.Harbor,Ind. I-2, Y1 ... 3.70
Johnstown,Pa. B2 ... 3.70
KansasCity,Mo. S5 ... 4.30
Lackawanna,N.Y. B2 ... 3.70
LosAngeles B3 ... 4.40
Milton,Pa. B6 ... 4.20
Minnequa,Colo. C10 ... 4.15
Niles,Calif. P1 ... 5.05
N.Tonawanda,N.Y. B11 ... 3.70
Pittsburg,Calif. C11 ... 4.40
Pittsburgh J5 ... 3.70
Portland,Oreg. O4 ... 4.65
Seattle B3, N14 ... 4.45
So.Chicago R2, U5, W14 ... 3.70
So.Duquesne,Pa. U5 ... 3.70
So.SanFran.,Cal. B3 ... 4.45
Struthers,O. Y1 ... 3.70
Torrance,Calif. C11 ... 4.40
Weirton,W.Va. W6 ... 3.85
Youngstown R2, U5 ... 3.70

BAR SIZE ANGLES, S. SHAPES
Aliquippa,Pa. J5 ... 3.70
Atlanta A11 ... 4.25
Johnstown,Pa. B2 ... 3.70
Lackawanna,N.Y. B2 ... 3.70
Niles,Calif. P1 ... 5.05
Portland,Oreg. O4 ... 4.65
SanFrancisco S7 ... 4.85

BAR SIZE ANGLES; H.R. CARBON
Bethlehem,Pa. B2 ... 3.90

BARS, Hot-Rolled Alloy
Bethlehem,Pa. B2 ... 4.30
Buffalo R2 ... 4.30
Canton,O. R2 ... 4.30
Canton,O.(29) T7 ... 3.95
Clairton,Pa. U5 ... 4.30
Detroit R7 ... 4.45
Ecorse,Mich. G5 ... 4.65
Fontana,Calif. K1 ... 5.55
Gary,Ind. U5 ... 4.30
Houston,Tex. S5 ... 4.70
Ind.Harbor,Ind. I-2, Y1 ... 4.30
Johnstown,Pa. B2 ... 4.30
KansasCity,Mo. S5 ... 4.90
Lackawanna,N.Y. B2 ... 4.30
LosAngeles B3 ... 5.35
Massillon,O. R2 ... 4.30
Midland,Pa. C18 ... 4.30
So.Chicago R2, U5, W14 ... 4.30
So.Duquesne,Pa. U5 ... 4.30
Struthers,O. Y1 ... 4.50
Warren,O. C17 ... 4.30
Youngstown U5 ... 4.30

BAR SHAPES, Hot-Rolled Alloy
Clairton,Pa. U5 ... 4.55
Gary,Ind. U5 ... 4.55
Youngstown U5 ... 4.55

BARS & SMALL SHAPES, H.R., High-Strength Low-Alloy
Aliquippa,Pa. J5 ... 5.55
Bessemer,Ala. T2 ... 5.55
Bethlehem,Pa. B2 ... 5.55
Clairton,Pa. U5 ... 5.55
Cleveland R2 ... 5.55
Fairfield,Ala. T2 ... 5.55
Fontana,Calif. K1 ... 6.60
Gary,Ind. U5 ... 5.55
Ind.Harbor,Ind. I-2 ... 5.55
IndianaHarbor,Ind. Y1 ... 6.05
Johnstown,Pa. B2 ... 5.55
Lackawanna,N.Y. B2 ... 5.55
LosAngeles B3 ... 6.25
Pittsburgh J5 ... 5.55
Seattle B3 ... 6.30
So.Duquesne,Pa. U5 ... 5.55
So.SanFrancisco B3 ... 6.30
Struthers,O. Y1 ... 6.05
Youngstown U5 ... 5.55

BARS, Cold-Finished Carbon
Ambridge,Pa. W18 ... 4.55
BeaverFalls,Pa. M12, R2 ... 4.55
Buffalo B5 ... 4.60
Camden,N.J. P13 ... 5.00
Carnegie,Pa. C12 ... 4.55
Chicago W18 ... 4.55
Cleveland A7, C20 ... 4.55
Detroit P17 ... 4.70
Donora,Pa. A7 ... 4.55
Elyria,O. W8 ... 4.55
FranklinPark,Ill. N5 ... 4.55
Gary,Ind. R2 ... 4.55
GreenBay,Wis. F7 ... 4.55
Hammond,Ind. L2, M13 ... 4.55
Hartford,Conn. R2 ... 5.10
Harvey,Ill. B5 ... 4.55
LosAngeles R2 ... 6.00
Mansfield,Mass. B5 ... 5.10
Massillon,O. R2, R8 ... 4.55
Monaca,Pa. S17 ... 4.55
Newark,N.J. W18 ... 5.00
Plymouth,Mich. P5 ... 4.80
Pittsburgh J5 ... 4.55
Putnam,Conn. W18 ... 5.10
Readville,Mass. C14 ... 5.10
St.Louis,Mo. M5 ... 4.95
So.Chicago,Ill. W14 ... 4.55
SpringCity,Pa.(5) K3 ... 5.00
Struthers,O. Y1 ... 4.55
Waukegan,Ill. A7 ... 4.55
Youngstown F3, Y1 ... 4.55

BARS, Cold-Finished Alloy
Ambridge,Pa. W18 ... 5.40
BeaverFalls,Pa. M12 ... 5.40
Bethlehem,Pa. B2 ... 5.40
Buffalo B5 ... 5.40
Camden,N.J. P13 ... 5.80
Canton,O. R2 ... 5.40
Canton,O.(29) T7 ... 4.90
Carnegie,Pa. C12 ... 5.40
Chicago W18 ... 5.40
Cleveland A7 ... 5.45
Cleveland C20 ... 5.40
Detroit P17 ... 5.55
Donora,Pa. A7 ... 5.45
Elyria,O. W8 ... 5.40
Gary,Ind. R2 ... 5.40
Hammond,Ind. L2, M13 ... 5.40
Hartford,Conn. R2 ... 5.85
Harvey,Ill. B5 ... 5.40
Lackawanna,N.Y. B2 ... 5.40
Mansfield,Mass. B5 ... 5.85
Massillon,O. R2, R8 ... 5.40
Midland,Pa. C18 ... 5.40
Monaca,Pa. S17 ... 5.40
Newark,N.J. W18 ... 5.75
Plymouth,Mich. P5 ... 5.60
So.Chicago,Ill. R2, W14 ... 5.40
Struthers,O. Y1 ... 5.40
Warren,O. C17 ... 5.40
Waukegan,Ill. A7 ... 5.45
Worcester,Mass. A7 ... 5.75
Youngstown F3, Y1 ... 5.40

RAIL STEEL BARS
ChicagoHts.(3,4) I-2, C2 ... 4.75
Franklin,Pa.(3, 4) F5 ... 4.75
FortWorth,Tex.(26) T1 ... 4.85
Huntingtn,W.Va.(3) W7 ... 5.50
Marion,O.(3) P11 ... 4.75
Moline,Ill.(3) R2 ... 3.80
Tonawanda(3,4) B12 ... 4.75
Williamsport(3) S19 ... 5.00
Williamsport(4) S19 ... 5.10

BARS, Wrought Iron
Dover,N.J.(Staybolt) U1 ... 15.00
Dover,(Eng.Bolt) U1 ... 13.50
Dover(Wrgt.Iron) U1 ... 12.25
Economy,Pa.(S.R.) B14 ... 9.60
Economy,Pa.(D.R.)B14 ... 11.90
Economy(Staybolt)B14 ... 12.20
McK.Rks.(Staybolt) L5 ... 14.50
McK.Rks.(S.R.) L5 ... 9.60
McK.Rks.(D.R.) L5 ... 13.00

BARS, Reinforcing (Fabricators)
AlabamaCity,Ala. R2 ... 3.70
Alton,Ill.(6) L1 ... 3.70
Atlanta A11 ... 4.25
Buffalo R2 ... 3.40
Cleveland R2 ... 3.70
Emeryville,Calif. J7 ... 4.45
Fairfield,Ala. T2 ... 3.40
Fontana,Calif. K1 ... 4.40
Gary,Ind. U5 ... 3.70
Houston,Tex. S5 ... 4.10
Ind.Harbor,Ind. I-2, Y1 ... 3.40
Johnstown,Pa. B2 ... 3.40
KansasCity,Mo. S5 ... 4.30
Lackawanna,N.Y. B2 ... 3.40
LosAngeles B3 ... 4.40
Milton,Pa. B6 ... 4.20
Minnequa,Colo. C10 ... 4.50
Niles,Calif. P1 ... 5.05
Pittsburg,Calif. C11 ... 4.40
Pittsburgh J5 ... 3.40
Portland,Oreg. O4 ... 4.65
SandSprings,Okla. S5 ... 4.60
Seattle B3, N14 ... 4.45
So.Chicago,Ill. R2 ... 3.40
So.Duquesne,Pa. U5 ... 3.70
So.San Francisco B3 ... 4.45
SparrowsPoint,Md. B2 ... 3.40
Struthers,O. Y1 ... 3.40
Torrance,Calif. C11 ... 4.40
Youngstown R2, U5 ... 3.40

BARS, Reinforcing (Fabricated, to Consumers)
Huntington,W.Va. W6 ... 5.50
Johnstown, ¼-1" B2 ... 4.75
LosAngeles B3 ... 5.45
Monaca,Pa. P11 ... 5.00
Seattle B3, N14 ... 5.55
So.SanFrancisco B3 ... 5.45
SparrowsPt. ¼-1" B2 ... 4.75
Williamsport,Pa. S19 ... 5.10

SHEETS, Hot-Rolled Steel
(18 gage and heavier)
AlabamaCity,Ala. R2 ... 3.60
Ashland,Ky.(8) A10 ... 3.60
Butler,Pa. A10 ... 3.60
Cleveland J5, R2 ... 3.60
Conshohocken,Pa. A3 ... 4.00
Detroit M1 ... 4.40
Ecorse,Mich.(8) G5 ... 3.80
Fairfield,Ala. T2 ... 3.60
Fontana,Calif. K1 ... 4.55
Gary,Ind. U5 ... 3.60
Geneva,Utah G1 ... 3.70
Ind.Harbor,Ind. I-2, Y1 ... 3.60
Irvin,Pa. U5 ... 3.60
Lackawanna,N.Y. B2 ... 3.60
Mansfield,Pa. U5 ... 3.60
Niles,O. N12 ... 3.75
Pittsburg,Calif. C11 ... 4.30
Pittsburgh J5 ... 3.60
Sharon,Pa. S3 ... 4.00
So.Chicago,Ill. W14 ... 3.60
SparrowsPoint,Md. B2 ... 3.60
Steubenville,O. W10 ... 3.60
Torrance,Calif. C11 ... 4.30
Warren,O. R2 ... 3.60
Weirton,W.Va. W6 ... 3.60
WestLeechburg,Pa. A4 ... 3.75
Youngstown U5, Y1 ... 3.60

SHEETS, H.R. (19 gage)
AlabamaCity,Ala. R2 ... 4.75
Dover,O. R1 ... 5.65
Ind.Harbor,Ind. I-2 ... 5.40
Mansfield,O. E6 ... 5.65
Niles,O. N12 ... 5.75
Torrance,Calif. C11 ... 5.40

SHEETS, H.R. (14-ga., heavier) High-Strength Low-Alloy
Cleveland J5, R2 ... 5.40
Conshohocken,Pa. A3 ... 5.65
Ecorse,Mich. G5 ... 5.95
Fairfield,Ala. T2 ... 5.40
Fontana,Calif. K1 ... 6.35
Gary,Ind. U5 ... 5.40
Ind.Harbor,Ind. I-2 ... 5.40
IndianaHarbor,Ind. Y1 ... 5.90
Irvin,Pa. U5 ... 5.40
Lackawanna(35) B2 ... 5.40
Pittsburgh J5 ... 5.40
Sharon,Pa. S3 ... 5.40
So.Chicago,Ill. U5 ... 5.40
SparrowsPoint(36) B2 ... 5.40
Warren,O. R2 ... 5.40
Weirton,W.Va. W6 ... 5.75
Yongstown U5 ... 5.40
Youngstown Y1 ... 5.90

SHEETS, Cold-Rolled High-Strength Low-Alloy
Cleveland J5, R2 ... 6.55
Ecorse,Mich. G5 ... 7.10
Fontana,Calif. K1 ... 7.50
Gary,Ind. U5 ... 6.55
IndianaHarbor,Ind. Y1 ... 7.05
IndianaHarbor,Ind. I-2 ... 6.55
Irvin,Pa. U5 ... 6.55
Lackawanna(37) B2 ... 6.55
Pittsburgh J5 ... 6.55
SparrowsPoint(38) B2 ... 6.55
Warren,O. R2 ... 6.55
Weirton,W.Va. W6 ... 6.90
Youngstown Y1 ... 7.05

SHEETS, Cold-Rolled Steel (Commercial Quality)

Butler,Pa. A10	4.35
Cleveland J5, R2	4.35
Ecorse,Mich. G5	4.55
Fairfield,Ala. T2	4.35
Follansbee,W.Va. F4	5.35
Fontana,Calif. K1	5.30
Gary,Ind. U5	4.35
GraniteCity,Ill. G4	5.05
Ind.Harbor,Ind. I-2, Y1	4.35
Irvin,Pa. U5	4.35
Lackawanna,N.Y. B2	4.35
Middletown,O. A10	4.35
Pittsburg,Calif. C11	5.30
Pittsburgh J5	4.35
SparrowsPoint,Md. B2	4.35
Steubenville,O. W10	4.35
Warren,O. R2	4.35
Weirton,W.Va. W6	4.35
Youngstown Y1	4.35

SHEETS, Galv'd No. 10 Steel

AlabamaCity,Ala., R2	4.80
Ashland,Ky.(8) A10	4.80
Canton,O. R2	4.80
Dover,O. R1	5.50
Fairfield,Ala. T2	4.80
Gary,Ind. U5	4.80
GraniteCity,Ill. G4	5.50
Ind.Harbor,Ind. I-2	4.80
Irvin,Pa. U5	4.80
Kokomo,Ind.(13) C16	5.20
MartinsFerry,O. W10	4.80
Niles,O. N12	6.00
Pittsburg,Calif. C11	5.55
SparrowsPoint,Md. B2	4.80
Steubenville,O. W10	4.80
Torrance,Calif. C11	5.55
Weirton,W.Va. W6	4.80

SHEETS, Galvanized No. 10, High-Strength Low-Alloy

Irvin,Pa. U5	7.20
SparrowsPoint(39) B2	6.75

SHEETS, Galvannealed Steel

Canton,O. R2	5.35
Irvin,Pa. U5	5.35
Kokomo,Ind.(13) C16	5.75
Niles,O. N12	6.55

SHEETS, ZINCGRIP Steel No. 10

Butler,Pa. A10	5.05
Middletown,O. A10	5.05

SHEETS, Electro Galvanized

Cleveland R2 (28)	5.65
Niles,O. R2 (28)	5.65
Weirton,W.Va. W6	5.50

SHEETS, Zinc Alloy

Ind.Harbor,Ind. I-2	5.70

SHEETS, Drum Body

Pittsburg,Calif. C11	4.30
Torrance,Calif. C11	4.30

SHEETS, Well Casing

Fontana,Calif. K1	5.10
Torrance,Calif. C11	5.10

BLUED Stock, 29 Ga.

Yorkville,O. W10	6.80
Follansbee,W.Va.(23)F4	6.85

ROOFING SHORT TERNES (8 lb coated)

Gary,Ind. U5	9.50

MANUFACTURING TERNES (Special Coated)

Fairfield,Ala. T2	$7.60
Gary,Ind. U5	7.50
Irvin,Pa. U5	7.50
SparrowsPoint,Md. B2	7.60
Yorkville,O. W10	7.50

SHEETS, LT. Coated Ternes, 6 lb

Yorkville,O. W10	$8.40

SHEETS, Mfg. Ternes, 8 lb (Commercial Quality)

Gary,Ind. U5	$9.50
Yorkville,O. W10	9.50

SHEETS, LONG Terne Steel (Commercial Quality)

BeechBottom,W.Va.W10	5.20
Gary,Ind. U5	5.20
Mansfield,O. E6	6.05
Middletown,O. A10	5.20
Niles,O. N12	6.00
Weirton,W.Va. W6	5.20

SHEETS, Long Terne, Ingot Iron

Middletown,O. A10	5.60

SHEETS, Enameling Iron

Ashland,Ky.(8) A10	4.65
Cleveland R2	4.65
Gary,Ind. U5	4.65
GraniteCity,Ill. G4	5.35
Ind.Harbor,Ind. I-2	4.65
Irvin,Pa. U5	4.65
Middletown,O. A10	4.65
Youngstown Y1	4.65

Canton,O. R2	5.65	6.10
Fairfield,Ala. T2	5.60	5.85

SHEETS, Culvert	Cu	Cu
No. 16	Alloy	Fe
Ashland A10	5.60	...
Gary U5	5.60	5.85
IndianaHarbor I-2	5.60	5.85
Irvin,Pa. U5	5.60	5.85
Kokomo C16	6.25	...
MartinsFy,O. W10	5.60	5.85
Pittsburg,Cal. C11	6.35	...
SparrowsPt. B2	5.60	...
Torrance,Cal. C11	6.35	...

SHEETS, Culvert, No. 16 Pure Iron

Ashland,Ky. A10	5.85
Fairfield,Ala. T2	5.85

SHEETS, Hot-Rolled Ingot Iron 18 Gage and Heavier

Ashland(8) A10	3.85
Cleveland R2	4.20
Ind.Harbor,Ind. I-2	3.85
Warren,O. R2	4.20

SHEETS, Cold-Rolled Ingot Iron

Cleveland R2	4.95
Middletown,O. A10	4.85
Warren,O. R2	4.95

SHEETS, Galvanized Ingot Iron No. 10 flat

Ashland,Ky.(8) A10	5.05
Canton,O. R2	5.55

SHEETS, ZINCGRIP Ingot Iron

Butler,Pa. A10	5.30
Middletown,O. A10	5.30

SHEETS, ALUMINIZED

Butler,Pa. A10	8.15

TIN PLATE, American Coke (Base Box)

	1.25 lb	1.50 lb
Aliquippa J5	$8.45	$8.70
Fairfield,Ala. T2	8.55	8.80
Gary U5	8.45	8.70
Ind.Har. I-2, Y1	8.45	8.70
Irvin,Pa. U5	8.45	8.70
Pitts.,Cal. C11	9.20	9.45
Sp.Pt.,Md. B2	8.55	8.80
Warren R2	8.45	8.70
Weirton W6	8.45	8.70
Yorkville,O. W10	8.45	8.70

BLACK PLATE (Base Box)

Aliquippa,Pa. J5	$6.25
Fairfield,Ala. T2	6.35
Gary,Ind. U5	6.25
GraniteCity,Ill. G4	6.45
Ind.Harbor,Ind. I-2, Y1	6.25
Irvin,Pa. U5	6.25
Niles,O. R2	6.25
Pittsburg,Calif. C11	7.00
SparrowsPoint,Md. B2	6.35
Warren,O. R2	6.25
Weirton,W.Va. W6	6.25
Yorkville,O. W10	6.25

HOLLOWARE ENAMELING Black Plate (29 gage)

Follansbee,W.Va. F4	5.85
Gary,Ind. U5	5.85
GraniteCity,Ill. G4	6.05
Ind.Harbor,Ind. Y1	5.30
Irvin,Pa. U5	5.85
Yorkville,O. W10	6.15

STRIP, Hot-Rolled Alloy

Bridgeprt,Conn.(10) S15	5.45
Carnegie,Pa. S18	5.85
Fontana,Calif. K1	6.70
Gary,Ind. U5	5.50
Houston,Tex. S5	5.90
KansasCity,Mo. S5	6.10
Midland,Pa. C18	5.85
NewBritn,Conn.(10) S15	5.45
Sharon,Pa. S8	5.85
Youngstown U5	5.50

STRIP, Hot-Rolled, High-Strength Low-Alloy

Bessemer,Ala. T2	5.30
Conshohocken,Pa. A3	5.55
Ecorse,Mich. G5	5.95
Fairfield,Ala. T2	5.30
Fontana,Calif. K1	6.20
Gary,Ind. U5	5.30
Ind.Harb.,Ind. I-2	5.30
IndianaHarbor,Ind. Y1	5.80
Lackawanna,N.Y. B2	4.95
LosAngeles(25) B3	6.05
Seattle B3	6.30
Sharon,Pa. S3	5.40
So SanFrancisco(25) B3	6.05
SparrowsPoint,Md. B2	4.95
Warren,O. R2	5.30
Weirton,W.Va. W6	5.75
Youngstown Y1	5.80
Youngstown U5	5.30

STRIP, Cold-Rolled, High-Strength Low-Alloy

Cleveland J5	6.70
Cleveland A7	6.55
Dover,O. G6	7.30
Fontana,Calif. K1	6.95
Lackawanna,N.Y. B2	6.40
Sharon,Pa. S3	6.55
SparrowsPoint,Md. B2	6.40
Warren,O. R2	6.55
Weirton,W.Va. W6	7.20
Youngstown Y1	7.05

STRIP, Hot-Rolled Carbon

Ala.City,Ala.(27) R2	3.50
Alton,Ill.(1) L1	3.75
Ashland,Ky.(8) A10	3.50
Atlanta A11	4.05
Bessemer,Ala. T2	3.50
Bridgeprt,Conn.(10) S15	4.00
Buffalo(27) R2	3.50
Butler,Pa. A10	3.50
Carnegie,Pa. S18	4.00
Conshohocken,Pa. A3	3.90
Detroit M1	4.40
Ecorse,Mich. G5	3.80
Fairfield,Ala. T2	3.50
Fontana,Calif. K1	4.75
Gary,Ind. U5	3.50
Houston,Tex. S5	4.90
Ind.Harbor,Ind. I-2, Y1	3.50
Johnstown,Pa.(25) B2	3.50
KansasCity,Mo.(9) S5	4.10
Lackawanna,N.Y.(32)B2	3.50
LosAngeles B3	4.25
Milton,Pa. B6	4.00
Minnequa,Colo. C10	4.55
NewBritain(10) S15	4.00
N.Tonawanda,N.Y. B11	3.50
Pittsburg,Calif. C11	4.25
Riverdale,Ill. A1	3.50
SanFrancisco S7	4.85
Seattle B3, N14	4.50
Sharon,Pa. S3	4.00
So.Chicago,Ill. W14	3.50
So.SanFrancisco B3	4.25
SparrowsPoint,Md. B2	3.50
Torrance,Calif. C11	4.25
Warren,O. R2	3.50
Weirton,W.Va. W6	3.60
WestLeechburg,Pa. A4	3.75
Youngstown U5, Y1	3.50

STRIP, Cold-Rolled Alloy Steel

Bridgeprt,Conn.(10)S15	10.75
Carnegie,Pa. S18	10.60
Cleveland A7	10.00
Dover,O. G6	10.50
Fontana,Calif. K1	11.65
Harrison,N.J. C18	10.60
Midland,Pa. C18	10.60

STRIP, Cold-Finished, Spring Steel (Annealed)	0.26-0.40C	0.41-0.60C	0.61-0.80C	0.81-1.05C	1.06-1.35C
Berea, O. C7	...	6.80	7.40	9.35	11.65
Bridgeport,Conn.(10) S15	5.35	6.80	7.40	9.35	11.65
Bristol, Conn. W1	...	...	7.70	9.65	...
Carnegie,Pa. S18	...	6.80	7.40	9.35	11.65
Cleveland A7	4.65	6.45	7.40	9.35	11.65
Dearborn,Mich. D3	5.60	7.05	7.65	...	...
Detroit D2	5.60	6.65	7.25	...	...
Dover,O. G6	5.50	6.80	7.40	9.35	11.65
FranklinPark,Ill. T6	5.00	6.60	7.35	9.50	11.80
Harrison,N.J. C18	...	...	7.70	9.65	11.95
Mattapan,Mass. T6	5.50	6.75	7.70	9.65	11.95
NewBritn.,Conn.(10) S15	5.35	6.80	7.40	9.35	11.65
NewCastle,Pa. B4	5.35	6.80	7.40	9.35	...
NewCastle,Pa. E5	5.50	6.80	7.40	9.35	11.65
NewHaven,Conn. D2	5.85	6.75	7.35	...	...
NewYork W3	...	7.10	7.70	9.65	11.95
Pawtucket,R.I. NS: Cleve.-or-Pitts.Base	...	6.80	7.40	9.35	11.65
Worcester,Base	5.85	7.10	7.70	9.65	11.95
Sharon,Pa. S3	5.35	6.80	7.40	9.35	11.65
Trenton,N.J. R5	...	7.10	7.70	9.65	11.95
Wallingford,Conn. W2	5.85	6.75	7.35	9.30	11.60
Weirton,W.Va. W6	5.35	6.80	7.40	9.35	11.65
Worcester,Mass. A7	4.95	6.75	7.70	9.65	11.95
Worcester,Mass. T6	5.50	6.75	7.70	9.65	11.95
Youngstown C8	...	6.80	7.40	9.35	11.65

Spring Steel (Tempered)

Trenton, N. J. R5	...	...	10.30	12.50	15.35
Harrison,N.J. C18	...	...	10.30	12.50	15.35
NewYork, W3	...	...	10.30	12.50	15.35
NewBritn,Conn.(10)S15					10.75
Pawtucket,R.I.(11) NS					10.75
Pawtucket,R.I.(12) NS					11.05
Sharon,Pa. S3					10.60
Worcester,Mass. A7					10.30
Youngstown C8					10.60

STRIP, Cold-Rolled Carbon

Anderson,Ind.(40) G6	5.50
Berea,O. C7	6.60
Bridgeprt,Conn.(10) S15	5.35
Butler,Pa. A10	4.65
Cleveland A7, J5	4.65
Dearborn,Mich. D3	5.60
Detroit D2	5.60
Detroit M1	5.45
Dover,O.(40) G6	5.50
Ecorse,Mich. G5	4.85
Follansbee,W.Va. F4	5.35
Fontana,Calif. K1	6.30
FranklinPark,Ill.(40)T6	4.90
Ind.Harbor,Ind. I-2	4.90
Lackawanna,N.Y. B2	4.65
LosAngeles C1	5.40
Mattapan,Mass. T6	5.50
Middletown,O. A10	4.65
NewBritain(10) S15	5.35
NewCastle,Pa. B4	5.35
NewCastle(40) E5	5.25
NewHaven,Conn. D2	5.85
NewHaven,Conn. A7	5.15
Pawtucket,R.I. R3	6.00
Pawtucket,R.I.(21) NS	5.85
Riverdale,Ill.(40) A1	4.90
Rome,N.Y. R6	5.10
Sharon,Pa. S3	5.35
SparrowsPoint,Md. B2	4.65
Trenton,N.J. R5	6.00
Wallingford,Conn. W2	5.85
Warren,O.(40) T5	5.25
Warren,O. R2	4.65
Weirton,W.Va. W6	4.65
Youngstown C8 (40)	5.25
Youngstown Y1	4.65

STRIP, Electro Galvanized

Dover,O. G6	5.50
Warren,O. T5	5.25
Weirton,W.Va. W6	4.65
Youngstown C8	5.25

TIN PLATE, Electrolytic (Base Box)

	0.25 lb	0.50 lb	0.75 lb
Aliquippa,Pa. J5	$7.15	$7.40	$7.80
Fairfield,Ala. T2	7.25	7.50	7.90
Gary,Ind. U5	7.15	7.40	7.80
GraniteCity,Ill. G4	7.35	7.60	8.00
Ind.Harbor,Ind. I-2, Y1	7.15	7.40	7.80
Irvin,Pa. U5	7.15	7.40	7.80
Niles,O. R2	7.15	7.40	7.80
Pittsburg,Calif. C11	7.90	8.15	8.55
SparrowsPoint,Md. B2	7.25	7.50	7.90
Weirton,W.Va. W6	7.15	7.40	7.80
Yorkville,O. W10	7.15	7.40	7.80

SHEETS, SILICON, H.R. or C.R.(22 Ga.) COILS (Cut Lengths ½c lower)	Field	Armature	Electric	Motor	Dynamo
BeechBottom W10 (cut lengths)	...	...	7.25	8.50	9.30
Brackenridge,Pa A4	...	...	7.75	9.00	9.80
GraniteCity,Ill.G4 (cut lengths)	...	...	7.95	9.20	...
Ind.Harbor,Ind. I-2	6.95	7.25	(34)	...	...
Mansfield,O. E6 (cut lengths)	7.10	7.25	7.75	9.00	9.80
Niles,O. N12 (cut lengths)	..	6.75	7.25	..	..
Vandergrift,Pa. U5	..	7.25	7.75	9.00	9.80
Warren,O. R2	6.95	7.25	7.75	9.00	9.80
Zanesville,O. A10	...	7.25	7.75	9.00	9.80

SHEETS, SILICON (22 Ga. Base) Coils (Cut Lengths ½c lower)

Transformer Grade	72	65	58	52
BeechBottom W10 (cut lengths)	9.85	10.40	11.10	11.90
Brackenridge,Pa. A4	10.35	...	...	...
Vandergrift,Pa. U5	10.35	10.90	11.60	12.40
Warren,O. R2	10.35	...	...	...
Zanesville,O. A10	10.35	10.90	11.60	12.40

H.R. or C.R. COILS AND CUT LENGTHS, SILICON (22 Ga.)

	T-100	T-90	T-80	T-73
Butler,Pa. A10 (C.R.)	...	...	14.75	15.25
Vandergrift,Pa. U5	12.90	13.75	14.75	15.25

Key to Producers

A1 Acme Steel Co.
A3 Alan Wood Steel Co.
A4 Allegheny Ludlum Steel
A7 American Steel & Wire
A8 Anchor Drawn Steel Co.
A9 Angell Nail & Chaplet
A10 Armco Steel Corp.
A11 Atlantic Steel Co.
A13 American Cladmetals Co.

B1 Babcock & Wilcox Tube
B2 Bethlehem Steel Co.
B3 Beth. Pac. Coast Steel
B4 Blair Strip Steel Co.
B5 Bliss & Laughlin Inc.
B6 Boiardi Steel Corp.
B8 Braeburn Alloy Steel
B11 Buffalo Bolt Co.
B12 Buffalo Steel Co.
B14 A. M. Byers Co.

C1 Calif. Cold Rolled Steel
C2 Calumet Steel Div., Borg-Warner Corp.
C4 Carpenter Steel Co.
C5 Central Iron & Steel Div. Barium Steel Corp.
C7 Cleve. Cold Rolling Mills
C8 Cold Metal Products Co.
C9 Colonial Steel Co.
C10 Colorado Fuel & Iron
C11 Columbia Steel Co.
C12 Columbia Steel & Shaft.
C13 Columbia Tool Steel Co.
C14 Compressed Steel Shaft.
C16 Continental Steel Corp.
C17 Copperweld Steel Co.
C18 Crucible Steel Co.
C19 Cumberland Steel Co.
C20 Cuyahoga Steel & Wire
C22 Claymont Steel Corp.

D2 Detroit Steel Corp.
D3 Detroit Tube & Steel
D4 Disston & Sons, Henry
D6 Driver Harris Co.
D7 Dickson Weatherproof Nail Co.

E1 Eastern Gas&Fuel Assoc.
E2 Eastern Stainless Steel
E4 Electro Metallurgical Co.
E5 Elliott Bros. Steel Co.
E6 Empire Steel Corp.

F2 Firth Sterling Steel
F3 Fitzsimons Steel Co.
F4 Follansbee Steel Corp.
F5 Franklin Steel Div., Borg-Warner Corp.
F6 Fretz-Moon Tube Co.
F7 Ft. Howard Steel & Wire
G1 Geneva Steel Co.
G2 Globe Iron Co.
G3 Globe Steel Tubes Co.
G4 Granite City Steel Co.
G5 Great Lakes Steel Corp.
G6 Greer Steel Co.

H1 Hanna Furnace Corp.
H4 Heppenstall Co.

I-1 Igoe Bros. Inc.
I-2 Inland Steel Co.
I-3 Interlake Iron Corp.
I-4 Ingersoll Steel Div., Borg-Warner Corp.

J1 Jackson Iron & Steel Co
J3 Jessop Steel Co.
J4 Johnson Steel & Wire Co
J5 Jones & Laughlin Steel
J6 Joslyn Mfg. & Supply
J7 Judson Steel Corp.
J8 Jersey Shore Steel Co.

K1 Kaiser Steel Corp.
K2 Keokuk Electro-Metals
K3 Keystone Drawn Steel
K4 Keystone Steel & Wire

L1 Laclede Steel Co.
L2 LaSalle Steel Co.
L3 Latrobe Electric Steel
L5 Lockhart Iron & Steel
L6 Lone Star Steel Co.
L7 Lukens Steel Co.

STRIP, Hot-Rolled Ingot Iron

Ashland,Ky.(8) A10	3.75
Warren,O. R2	4.10

Strip, Cold-Rolled Ingot Iron

Warren,O. R2	5.25

EIGHT COOPERAGE HOOP

Atlanta A11	4.05
Riverdale,Ill. A1	3.90
Sharon,Pa. S3	4.15
Youngstown U5	3.75

WIRE, Merchant Quality (6 to 8 gage)

	An'ld	Galv.
AlabamaCity R2	5.70	5.95
Aliquippa J5	5.70	6.15
Atlanta A11	5.95	6.40
Bartonville(19)K4	5.70	6.15
Buffalo W12	4.85	...
Cleveland A7	5.70	6.15
Crawfordsville MS	5.95	6.40
Donora A7	5.70	6.15
Duluth A7	5.70	6.15
Fairfield T2	5.70	6.15
Houston,Tex. S5	6.10	6.55
Johnstown B2	5.70	6.15
Joliet,Ill. A7	5.70	6.15
KansasCy, Mo. S5	6.30	6.75
Kokomo C16	5.80	6.05
LosAngeles B3	6.65	...
Minnequa C10	5.95	6.45
Monessen P7	5.95	6.40
Palmer W12	5.15	...
Pitts.Calif. C11	6.65	6.80
Prtsmth.(18)P12	6.10	6.60
Rankin A7	5.70	6.15
So.Chicago R2	5.70	5.95
So.S.Fran. C10	6.65	7.10
Sparrows Pt. B2	5.80	6.25
Sterling,Ill.(1)N15	5.70	6.15
Struthers,O. Y1	5.70	6.15
Torrance,Cal. C11	6.65	...
Worcester A7	6.00	6.45

WIRE (16 gage)	An'ld Stone	Galv. Stone
Aliquippa J5	10.15	12.15
Bartonville(1) K4	10.25	11.95
Cleveland A7	10.25	12.15
Crawfrdsvle MS	10.30	12.00
Fostoria,O. S1	10.40	13.00
Johnstown B2	10.25	12.15
Kokomo C16	10.25	11.95
Minnequa C10	10.40	12.40
Palmer,Mass. W12	10.25	12.15
Pitts.Cal. C11	10.60	12.50
Prtsmth.(18) P12	10.55	12.30
SparrowsPt. B2	10.35	12.25
Waukegan A7	10.25	12.15

ROPE WIRE	(A)	(B)
Bartonville,Ill. K4	8.55	8.80
Buffalo W12	8.55	8.80
Cleveland A7	8.55	8.80
Donora,Pa. A7	8.55	8.80
Fostoria,O. S1	8.85	9.10
Johnstown,Pa. B2	8.55	8.80
Monessen,Pa. P16	8.55	8.80
Monessen,Pa. P7	8.80	9.05
NewHaven A7	8.85	9.10
Palmer,Mass. W12	8.85	9.10
Portsmouth,O. P12	8.55	8.80
Roebling,N.J. R5	8.85	9.10
SparrowsPt. B2	8.65	8.90
Struthers,O. Y1	8.55	8.80
Trenton,N.J. A7	8.85	9.10
Waukegan,Ill. A7	8.55	8.80
Worcester J4, T6	8.85	9.10

(A) Plow and Mild Plow.
(B) Improved Plow.

WIRE, Manufacturers Bright, Low Carbon

AlabamaCity,Ala. R2	4.85
Aliquippa,Pa. J5	4.85
Atlanta A11	5.10
Alton,Ill.(1) L1	4.85
Bartonville,Ill.(1) K4	4.85
Buffalo W12	4.85
Chicago W13	5.10
Cleveland A7, C20	4.85
Crawfordsville,Ind. MS	5.10
Donora,Pa. A7	4.85
Duluth,Pa. A7	4.85
Fairfield,Ala. T2	4.85
Fostoria,O.(24) S1	5.35
Houston S5	5.25
Johnstown,Pa. B2	4.85
Joliet,Ill. A7	4.85
KansasCy, Mo. S5	5.30
Kokomo,Ind. C16	4.85
Minnequa,Colo. C10	5.10
Monessen,Pa. P7	5.10
Newark, 6-8ga. I-1	5.50
No. Tonawanda B11	4.85
Palmer,Mass. W12	5.15
Pittsburg,Calif. C11	5.80
Portsmouth,O. P12	5.25
Rankin,Pa. A7	4.85
So.Chicago,Ill. R2	4.85
So. SanFrancisco C10	5.80
SparrowsPoint,Md. B2	4.95
Sterling,Ill.(1) N15	4.85
Struthers,O. Y1	4.85
Torrance,Calif. C11	5.80
Waukegan,Ill. A7	4.85
Worcester,Mass. A7, T6	5.15

WIRE, Cold-Rolled Flat

Anderson,Ind. G6	6.20
Buffalo W12	6.35
Cleveland A7	5.85
Crawfordsville,Ind. MS	6.20
Detroit D2	6.20
Dover,O. G6	6.20
Fostoria,O. S1	6.00
Kokomo,Ind. C16	5.70
FranklinPark,Ill. T6	6.20
Massillon,O. R8	5.85
Monessen,Pa. P16	5.85
Monessen,Pa. P7	6.10
NewHaven,Conn. D2	6.50
Pawtucket,R.I.(12) N8	6.85
Trenton,N.J. R5	6.15
Worcester A7	6.15
Worcester T6	6.50
Worcester W12	6.65

WIRE, Fine & Weaving(8" Coils)

Bartonville,Ill.(1) K4	8.90
Buffalo W12	8.90
Chicago W13	8.90
Cleveland A7	8.90
Crawfordsville,Ind. MS	8.95
Fostoria,O. S1	8.90
Johnstown,Pa. B2	8.90
Kokomo,Ind. C16	8.90
Monessen,Pa. P16	8.90
Palmer,Mass. W12	9.20
Portsmouth,O. P12	8.90
Roebling,N. J. R5	9.20
Waukegan,Ill. A7	8.90
Worcester,Mass. A7, T6	9.20

WIRE, Galv'd ACSR For Cores

Bartonville,Ill. K4	8.50
Monessen,Pa. P16	8.50
Roebling,N.J. R5	8.80
SparrowsPoint,Md. B2	8.60
Johnstown,Pa. B2	8.50

WIRE, Tire Bead

Bartonville,Ill.(1) K4	10.90
Monessen,Pa. P16	11.40
Roebling,N.J. R5	11.55

WIRE, MB Spring, High Carbon

Aliquippa,Pa. J5	6.25
Alton,Ill.(1) L1	6.25
Bartonville,Ill.(1) K4	6.25
Buffalo W12	6.25
Cleveland A7	6.25
Donora,Pa. A7	6.25
Duluth A7	6.25
Fostoria,O. S1	6.25
Johnstown,Pa. B2	6.25
LosAngeles B3	7.20
Milbury,Mass.(12) N6	8.05
Monessen,Pa. P7, P16	6.25
Palmer,Mass. W12	6.55
Pittsburg,Calif. C11	7.20
Roebling,N.J. R5	6.55
Portsmouth,O. P12	6.25
So.Chicago,Ill. R2	6.25
So.SanFrancisco C10	6.85
SparrowsPoint,Md. B2	6.35
Struthers,O. Y1	6.25
Trenton,N.J. A7	6.55
Waukegan,Ill. A7	6.25
Worcester A7, T6, W12	6.55
Worcester,Mass. J4	6.75

WIRE, Upholstery Spring

Aliquippa,Pa. J5	5.90
Alton,Ill.(1) L1	5.90
Buffalo W12	5.90
Cleveland, A7	5.90
Donora,Pa. A7	5.90
Duluth A7	5.90
Johnstown,Pa. B2	5.90
LosAngeles B3	6.85
Monessen,Pa. P7, P16	5.90
NewHaven,Conn. A7	6.20
Palmer,Mass. W12	6.20
Pittsburg,Calif. C11	7.10
Portsmouth,O. P12	5.90
Roebling,N.J. R5	6.20
So.Chicago,Ill. R2	5.90
SparrowsPoint,Md. B2	6.00
Torrance,Calif. C11	7.10
Trenton,N.J. A7	6.20
Waukegan,Ill. A7	5.90
Worcester,Mass. A7	6.20

WOVEN FENCE, 9-15½ Ga. Col.

AlabamaCity,Ala. R2	126
Ala City,Ala.,17-18ga.R2	213
Aliquippa,Pa.9-14½ga.J5	130
Atlanta A11	133
Bartonville,Ill.(19) K4	130
Crawfordsville,Ind. MS	132
Donora,Pa. A7	130
Duluth A7	130
Fairfield,Ala. T2	130
Houston,Tex. S5	138
Johnstown,Pa. B2	130
Johnstown,17ga.,6" B2	204
Johnstown,17ga.,4" B2	207
Joliet,Ill. A7	130
KansasCity,Mo. S5	142
Kokomo,Ind. C16	132
Minnequa,Colo. C10	138
Monessen,Pa. P7	135
Pittsburg,Calif. C11	153
Portsmouth,O.(18) P12	137
Rankin,Pa. A7	130
So.Chicago,Ill. R2	126
Sterling,Ill.(1) N15	130

FENCE POSTS

	Col.
ChicagoHts.,Ill. C2	140
Duluth A7	125
Franklin,Pa. F5	140
Huntington,W.Va. W7	140
Johnstown,Pa. B2	140
Marion,O. P11	140
Minnequa,Colo. C10	130
Moline,Ill. B2	136
So.Chicago R2	140
Tonawanda B12	140
Williamsport,Pa. S19	150

WIRE, Barbed

	Col.
AlabamaCity,Ala. R2	136
Aliquippa,Pa. J5	140
Atlanta A11	143
Bartonville,Ill.(19) K4	143
Crawfordsville MS	145
Donora,Pa. A7	140
Duluth,Minn. A7	140
Fairfield,Ala. T2	140
Houston,Tex. S5	148
Johnstown,Pa. B2	140
Joliet,Ill. A7	140
KansasCity, Mo. S5	152
Kokomo,Ind. C16	142
Minnequa,Colo. C10	146
Monessen,Pa. P7	145
Pittsburg,Calif. C11	160
Portsmouth,O.(18) P12	147
Rankin,Pa. A7	140
So.Chicago,Ill. R2	136
So.SanFran.,Calif. C10	160
SparrowsPoint,Md. B2	142
Sterling,Ill.(1) N15	140

BALE TIES, Single Loop

	Col.
AlabamaCity, Ala. R2	123
Atlanta A11	126
Bartonville,Ill.(19) K4	123
Crawfordsville MS	132
Donora,Pa. A7	123
Duluth A7	123
Fairfield,Ala. T2	123
Joliet,Ill. A7	123
KansasCity,Mo. S5	135
Kokomo,Ind. C16	125
Minnequa,Colo. C10	128
Pittsburg,Calif. C11	147
So.Chicago,Ill. R2	123
So.SanFran.,Calif. C10	147
SparrowsPoint,Md. B2	125
Sterling,Ill.(1) N15	123

NAILS & STAPLES, Non-Stock

AlabamaCity,Ala. R2	6.10
Bartonville,Ill.(19) K4	5.95
Crawfordsville,Ind. MS	6.30
Donora,Pa. A7	5.95
Duluth A7	5.95
Johnstown,Pa. B2	5.95
Kokomo,Ind. C16	6.05
Minnequa,Colo. C10	6.20
Pittsburg,Calif. C11	6.90
Portsmouth,O. P12	6.25
Rankin,Pa. A7	5.95
So.Chicago,Ill. R2	6.10
SparrowsPoint,Md. B2	6.05
Sterling,Ill.(1) N15	5.65
Worcester,Mass. A7	6.25

NAILS, Cut (100 lb keg) To dealers (33)

Conshohocken,Pa. A3	$2.35
Wheeling,W.Va. W10	7.15

NAILS & STAPLES, Stock To dealers & mfrs. (7)

	Col.
AlabamaCity,Ala. R2	118
Aliquippa,Pa.(13) J5	118
Atlanta A11	121
Bartonville,Ill.(19) K4	118
Chicago,Ill. W13	118
Cleveland A9	125
Crawfordsville,Ind. MS	122
Donora,Pa. A7	118
Duluth A7	118
Fairfield,Ala. T2	118
Galveston,Tex. D7	126
Houston,Tex. S5	126
Johnstown,Pa. B2	118
Joliet,Ill. A7	118
KansasCity,Mo. S5	130
Kokomo,Ind. C16	120
Minnequa,Colo. C10	123
Monessen,Pa. P7	124
Pittsburg,Calif. C11	137
Portsmouth,O. P12	124
Rankin,Pa. A7	118
So.Chicago,Ill. R2	118
SparrowsPoint,Md. B2	120
Sterling,Ill.(1) N15	118
Torrance,Calif. C11	138
Worcester,Mass. A7	124

STANDARD TRACK SPIKES

Ind.Harbor,Ind. I-2, Y1	6.15
KansasCity,Mo. S5	6.40
Lebanon,Pa. B2	6.15
Minnequa,Colo. C10	6.15
Pittsburgh J5	6.15
Seattle B3	6.65
So.Chicago,Ill. R2	6.15
Struthers,O. Y1	6.15
Youngstown R2	6.15

TRACK BOLTS (20) Treated

KansasCity,Mo. S5	9.85
Lebanon,Pa.(32) B2	9.85
Minnequa,Colo. C10	9.85
Pittsburgh O3, P14	9.85
Seattle B3	10.10

TIE PLATES

Fairfield,Ala. T2	4.50
Gary,Ind. U5	4.50
Ind.Harbor,Ind. I-2	4.50
Lackawanna,N.Y. B2	4.50
Minnequa,Colo. C10	4.50
Pittsburg,Calif. C11	4.65
Seattle B3	4.65
Steelton,Pa. B2	4.50
Torrance,Calif. C11	4.65

JOINT BARS

Bessemer,Pa. U5	4.70
Fairfield,Ala. T2	4.70
Ind.Harbor,Ind. I-2	4.70
Joliet,Ill. U5	4.70
Lackawanna,N.Y. B2	4.70
Minnequa,Colo. C10	4.70
Steelton,Pa. B2	4.70

AXLES

Ind.Harbor,Ind. S18	5.60
Johnstown,Pa. B2	5.60

RAILS	Std. No. 1	Std. No. 2	Std. All No. 2	TeeRails 60 lb Under
Bessemer,Pa. U5	3.60	3.50	3.55	4.00
Ensley,Ala. T2	3.60	3.50	...	4.00
Fairfield,Ala. T2	...	...	...	4.00
Gary,Ind. U5	3.60	3.50	3.55	...
Huntington,W.Va. W7	...	...	...	5.00
Ind.Harbor,Ind. I-2	3.60	3.50	3.55	...
Johnstown,Pa. B2	...	...	...	(16)4.00
Lackawanna,Pa. B2	3.60	3.50	...	4.00
Minnequa,Colo. C10	3.60	3.50	...	4.50
Steelton,Pa. B2	3.60	3.50	...	...
Williamsport,Pa. S19	...	...	...	4.75

Key to Producers

M1 McLouth Steel Corp.
M4 Mahoning Valley Steel
M5 Medart Co.
M6 Mercer Tube & Mfg. Co.
M8 Mid-States Steel & Wire
M9 Midvale Co.
M12 Moltrup Steel Products
M13 Monarch Steel Co.
M14 McInnes Steel Co.

N2 National Supply Co.
N3 National Tube Co.
N5 Nelsen Steel & Wire Co.
N6 NewEng.HighCarb.Wire
N8 Newman-Crosby Steel
N12 Niles Rolling Mill Co.
N14 Nrthwst. Steel Roll.Mills
N15 Northwestern S.&W. Co.
N16 New Delphos Mfg. Co.

O5 Oliver Iron & Steel Corp.
O8 Oregon Steel Mills

P1 Pacific States Steel Corp.
P2 Pacific Tube Co.
P4 Phoenix Iron & Steel Co.
P5 Pilgrim Drawn Steel
P6 Pittsburgh Coke&Chem.
P7 Pittsburgh Steel Co.
P9 Pittsburgh Tube Co.
P11 Pollak Steel Co.
P12 Portsmouth Division, Detroit Steel Corp.
P13 Precision Drawn Steel
P14 Pitts.Screw & Bolt Co.
P15 Pittsburgh Metallurgical
P16 Page Steel & Wire Div., Amer. Chain & Cable
P17 Plymouth Steel Co.

R1 Reeves Steel & Mfg. Co.
R2 Republic Steel Corp.
R3 Rhode Island Steel Corp.
R5 Roebling's Sons, John A.
R6 Rome Strip Steel Co.
R7 Rotary Electric Steel Co.
R8 RelianceDiv., EatonMfg.

S1 Seneca Wire & Mfg. Co.
S3 Sharon Steel Corp.
S5 Sheffield Steel Corp.
S6 Shenango Furnace Co.
S7 Simmons Co.
S8 Simonds Saw & Steel Co.
S9 Sloss-Sheffield S.&I. Co.
S13 Standard Forgings Corp.
S14 Standard Tube Co.
S15 Stanley Works
S16 Struthers Iron & Steel
S17 Superior Drawn Steel Co.
S18 Superior Steel Corp.
S19 Sweet's Steel Co.
S20 Southern States Steel

T2 Tenn. Coal, Iron & R.R.
T3 Tenn. Prod. & Chem.
T4 Texas Steel Co.
T5 Thomas Steel Co.
T6 Thompson Wire Co.
T7 Timken Roller Bearing
T9 Tonawanda Iron Div. Am. Rad. & Stan. San.

U1 Ulster Iron Works
U4 Universal Cyclops Steel
U5 United States Steel Co.

V2 Vanadium-Alloys Steel
V3 Vulcan Crucible Steel Co.

W1 Wallace Barnes Co.
W2 Wallingford Steel Co.
W3 Washburn Wire Co.
W4 Washington Steel Corp.
W6 Weirton Steel Co.
W7 W. Va. Steel & Mfg. Co.
W8 West.Auto.Mach.Screw
W9 Wheatland Tube Co.
W10 Wheeling Steel Corp.
W12 Wickwire Spencer Steel Div., Colo. Fuel & Iron
W13 Wilson Steel & Wire Co.
W14 Wisconsin Steel Div. International Harvester
W15 Woodward Iron Co.
W18 Wyckoff Steel Co.

Y1 Youngstown Sheet & Tube

TOOL STEEL

Grade	Cents per lb	Grade	Cents per lb
Reg. Carbon	23.00	13.5W,4Cr,3V	140.00
Extra Carbon	27.00	18W,4Cr,2V,8Co	217.50
Spec. Carbon	32.50	19W,4Cr,2V,7Co	217.50
Oil Hardening	35.00	18.25W,4.25Cr,1V,4.75Co	185.50
Cr Hot Wrk	35.00	20.2W,4.25Cr,1.6V,12.25Co	323.00
Hi-Carbon-Cr	63.50	1.5W,4Cr,1V,8.5Mo	78.50
18W,4Cr,1V	123.50	6.4W,4.5Cr,1.9V,5Mo	87.00
18W,4Cr,2V	138.00	6W,4Cr,3V,6Mo	109.50

Tool steel producers include: A4, A8, B2, B8, C4, C9, C13, C18, D4, F2, H4, J3, L3, M14, S8, U4, V2, V3.

(1) Chicago base.
(2) Angles, flats, bands.
(3) Merchant. (4) Reinforcing.
(5) Philadelphia del. base.
(6) Chicago or Birm. base.
(7) To jobbers, 3 cols. lower.
(8) 16 gage and heavier.
(9) 6 in. and narrower.
(10) Pittsburgh base.
(11) Cleveland & Pittsburgh base.
(12) Worcester, Mass. base.
(13) Add 0.50c for 17 Ga. & heavier.
(14) Also wide flange beams.
(15) ½" and thinner.
(16) 40 lb and under.
(17) Flats only.
(18) To dealers.
(19) Chicago & Pittsburgh base.
(20) Deduct 0.25c for untreated.
(21) New Haven, Conn. base.
(22) Del. San Fran. Bay area.
(24) Deduct 0.20c, finer than 15 Ga.
(25) Bar mill bands.
(26) Reinforcing, mill lengths, to fabricators, to consumers, 1 car.
(27) Bar mill sizes.
(28) Bonderized.
(29) Subject to 10% increase.
(30) Sheared; add 0.35c for universal mill.
(31) Not annealed.
(32) B4 edge or square edge.
(33) To jobbers, deduct 20 cents.
(34) 7.25c for cut lengths.
(35) 72" and narrower.
(36) 54" and narrower.
(37) 15 gage & lighter: 60" & narrower.
(38) 14 gage & lighter: 48" & narrower.
(39) 48" and narrower.
(40) Lighter than 0.035", 0.035" [illegible]

STANDARD PIPE, T. & C.

BUTTWELD

Size Inches	List Per Ft	Pounds Per Ft	Carload Discounts from List, % Black A	Black B	Black C	Galvanized D	Galvanized E	Galvanized F
⅛	5.5c	0.24	34.0	32.0	29.0	1.5	+0.5	+3.5
¼	6.0	0.42	28.5	26.5	23.5	+1.0	+3.0	+6.0
⅜	6.0	0.57	23.5	21.5	18.5	+7.0	+9.0	+12.0
½	8.5	0.85	36.0	34.0	35.0	14.0	12.0	13.0
¾	11.5	1.13	39.0	37.0	38.0	18.0	16.0	17.0
1	17.0	1.68	41.5	39.5	40.5	21.5	19.5	20.5
1¼	23.0	2.28	42.0	44.0	41.0	22.0	24.0	21.0
1½	27.5	2.78	42.5	41.5	41.5	23.0	21.5	22.0
2	37	3.68	43.0	41.0	42.0	23.5	21.5	22.5
2½	58.5	5.82	43.5	41.5	42.5	24.0	22.0	23.0
3	76.5	7.62	43.5	41.5	42.5	24.0	22.0	23.0

Column A: Etna, Pa. N2; Butler, Pa. ⅛-⅜", F6; Benwood, W. Va., 3½ points lower on ⅛", 1½ points lower on ¼", and 2 points lower on ⅜", W10; Sharon, Pa. M6, 1 point higher on ⅛", 2 points lower on ½" and ¾". Following make ½" and larger: Lorain, O., N3; Youngstown R2 and 36¼% on 3½" and 4"; Youngstown Y1; Aliquippa, Pa. J5. Fontana, Calif. K1 quotes 11½ points lower on ½" and larger continuous weld and 24% on 3½" and 4".

Columns B & E: Sparrows Point, Md. B2.

Columns C & F: Indiana Harbor, Ind., ½" through 3", Y1; Alton, Ill. (Gary base) L1.

Column D: Butler, Pa. F6, ⅛-⅜"; Benwood, W. Va. W10, except plus 3½% on ⅛", plus 2½% on ¼", plus 9% on ⅜"; Sharon, Pa. M6, plus 0.5 on ⅛", 1 point lower on ½", ¾", 1½ points lower on 1" and 1¼", 2 points lower on 1½", 2", 2½" and 3". Following quote only on ½" and larger: Lorain, O. N3; Youngstown R2, and 16½% on 3½" and 4"; Youngstown Y1; Aliquippa, Pa. J5 quotes 1 point lower on ¾", 2 points lower on 1", 1½ points lower on 1¼", 2 points lower on 1½" and 2", 1½ points lower on 2½" and 3"; Etna, Pa. N2 and 18½% on 3½" and 4".

SEAMLESS AND ELECTRIC WELD

Size Inches	List Per Ft	Pounds Per Ft	Carload Discounts from List, % Seamless Black A	Seamless Galv. B	Elec. Weld Black C	Elec. Weld Galv. D
2	37.0c	3.68	29.5	9.5	29.5	9.5
2½	58.5	5.82	32.5	12.5	32.5	12.5
3	76.5	7.62	32.5	12.5	32.5	12.5
3½	92.0	9.20	34.5	14.5	34.5	14.5
4	$1.09	10.89	34.5	14.5	34.5	14.5
5	1.48	14.81	37.0	17.0	37.0	17.0
6	1.92	19.18	37.0	17.0	37.0	17.0

Column A: Aliquippa J5; Ambridge N2; Lorain N3; Youngstown Y1.

Column B: Aliquippa J5 quotes 1½ pts lower on 2", 1 pt lower on 2½-6 in.; Lorain, N3; Youngstown Y1.

Columns C & D: Youngstown R2.

BOILER TUBES

Net base c.l. prices, dollars per 100 ft, mill; minimum wall thickness, cut lengths 10 to 24 ft, inclusive.

O.D. In.	B.W. Ga.	Seamless H.R.	Seamless C.D.	Elec. Weld H.R.	Elec. Weld C.D.
1	13	13.45	16.47	15.36	15.36
1¼	13	16.09	19.71	15.61	18.19
1½	13	17.27	21.15	17.25	20.30
1¾	13	19.29	23.62	19.62	23.09
2	13	21.62	26.48	21.99	25.86
2¼	13	24.35	29.82	24.50	28.84
2¼	12	26.92	32.97	26.98	31.76
2½	12	29.65	36.32	29.57	34.76
2¾	12	32.11	39.33	31.33	36.84
3	12	34.00	41.64	32.89	38.70

CLAD STEELS

(Cents per pound)

Cladding	Plates Carbon Base 10%	Plates Carbon Base 20%	Strip Cold-Rolled Carbon Base Both Sides	Sheets Carbon Base 10%	Sheets Carbon Base 20%	Sheets Cu Base Both Sides
Stainless						
302	...	...	...	19.75	27.50	77.00
304	25.00	28.00	...	20.75– 24.50	27.50	77.00
		29.50				
309	30.50	35.00	...	...	...	...
310	36.50	41.00	...	...	...	144.00
316	29.50	31.50– 34.00	...	26.00	36.50	...
317	34.50	39.00	...	...	...	...
318	38.50	38.00	...	...	...	...
321	26.50	31.00	...	23.00	33.00	111.00
347	27.50	30.50– 32.00	...	24.00	33.50	130.00
405	21.25	27.75	...	...	...	...
410	20.75	27.25	...	...	...	...
Nickel	33.25	44.25	41.00	54.00	...	...
Inconel	41.00	53.50	...	...	...	165.00
Monel	34.75	45.75	...	...	...	...
Copper*	...	...	23.70†	29.65‡	...	...

* Deoxidized. † 20.20c for hot-rolled. ‡ 26.40c for hot-rolled. Production points for carbon base products: Stainless plates, sheet, Conshohocken, Pa. A3 and New Castle, Ind. I-4; stainless-clad plates, Claymont, Del. W16, Coatesville, Pa. L7 and Washington, Pa. J3; nickel, inconel, monel-clad plates, Coatesville L7; nickel, monel, copper-clad strip, Carnegie, Pa., S18. Production point for copper-base sheets is Carnegie, Pa. A13.

BOLTS, NUTS

CARRIAGE, MACHINE BOLTS

(F.o.b. midwestern plants; per cent off list for less than case lots to consumers)

6 in. and shorter:
- ½-in. & smaller diam. 15
- ⅝-in. & ¾-in. 18.5
- ⅞-in. and larger 17.5

Longer than 6 in.:
- All diams. 14

Lag bolts, all diams.:
- 6 in. and shorter 23
- over 6 in. long 21

Ribbed Necked Carriage 18.5
Blank 34
Plow 34
Step, Elevator, Tap, and Sleigh Shoe 21
Tire bolts 12
Boiler & Fitting-Up bolts 31

NUTS

	Reg.	Heavy
H.P. & C.P. Square:		
½-in. & smaller	15	15
⅝-in. & ⅝-in.	12	6.5
¾-in.-1½-in.	9	1
1⅝ in. & larger	7.5	1
H.P. Hex.:		
½-in. & smaller	26	22
⅝-in. & ⅝-in.	16.5	6.5
¾-in.-1½-in.	12	2
1⅝ in. & larger	8.5	2
C.P. Hex.		
½-in. & smaller	26	22
⅝-in. & ⅝-in.	23	17.5
¾-in. & 1½-in.	19.5	12
1⅝-in. & larger	12	6.5

SEMIFINISHED NUTS

American Standard

(Per cent off list for less than case or keg quantities)

	Reg.	Hvy.
½-in. & smaller	35	28.5
⅝-in. & ¾-in.	29.5	22
¾-in.-1½-in.	24	15
1⅝-in. & larger	13	8.5
	Light	
⅞-in. & smaller	35	
1-in. to ⅝-in.	28.5	
¾-in. to 1½-in.	26	

STEEL STOVE BOLTS

(F.o.b. plant; per cent off list in packages)

Plain finish .....48 & 10
Plated finishes ...31 & 10

HEXAGON CAP SCREWS

(1020 steel; packaged; per cent off list)

6 in. or shorter:
- ⅝-in. & smaller 42
- ¾-in. through 1 in. .. 34

Longer than 6 in.:
- ⅝-in. & smaller 26
- ¾-in. through 1 in. ... 4

SQUARE HEAD SET SCREWS

(Packaged; per cent off list)

1 in. diam. x 6 in. and shorter 38
1 in. and smaller diam. x over 6 in. 26

HEADLESS SET SCREWS

(Packaged; per cent off list)

No. 10 and smaller 35
¼-in. diam. & larger.... 16
N.F. thread, all diams... 10

RIVETS

F.o.b. midwestern plants

Structural ½-in., larger 7.85c
½-in. under ..... 36 off

WASHERS, WROUGHT

F.o.b. shipping point, to jobbers ..List to list-plus-50c.

ELECTRODES

(Threaded, with nipples, unboxed, f.o.b. plant)

GRAPHITE

Diam.	Inches Length	Cents per lb
17,18,20	60,72	17.85
8 to 16	48,60,72	17.85
7	48,60	19.57
6	48,60	20.95
4.5⅛	40	21.50
3	40	22.61
2½	24,30	23.15
2	24,30	25.36

CARBON

40	100,110	8.03
35	100,110	8.03
30	84,110	8.03
24	72 to 104	8.03
17 to 20	34,90	8.03
14	60,72	8.57
10,12	60	8.84

STAINLESS STEEL

Type	Sheets	C.R. Strip	Bars Wire Structurals
301...	41.00	34.00	31.25
302...	41.00	36.50	31.25
303...	43.00	40.00	33.75
304...	43.00	38.50	32.75
309...	55.50	54.50	44.25
316...	56.50	58.50	48.75
321...	49.00	48.00	36.75
347...	53.50	52.00	41.25
410...	36.50	30.50	25.75
416...	37.00	37.00	26.25
420...	44.00	47.00	31.25
430...	39.00	31.00	26.25
501...	27.50	26.00	14.25
502...	28.50	27.00	15.25

Baltimore, Types 301 through 347 sheet, except 309 E2.

Brackenridge, Pa., sheets A4.

Bridgeville, Pa., bars, wire, sheets & strip U4.

Butler, Pa., sheets and strip except Types 303, 309, 416, 420, 501 & 502 A10.

Carnegie, Pa., sheets and strip except Types 303, 416, 501 & 502, S18.

Cleveland, strip A7.

Detroit, strip, except Types 309, 321, 416, 420, 501 and 502 M1.

Dunkirk,N.Y., bars, wire A4.

Duquesne, Pa., bars U5.

Fort Wayne, Ind., bars and wire, except Types 501 & 502 J6.

Gary, Ind., sheets except Type 416 U5.

Harrison, N. J., strip C18.

McKeesport, Pa., bars, sheets except Type 416 U5.

McKeesport, Pa., bars & wire except Types 301, 309, 501 & 502; strip Types 410 & 430 only F2.

Middletown, O., sheets and strip except Types 303, 416, 420, 501 and 502 A10.

Midland, sheets & strip C18.

Munhall, Pa., bars U5.

Pittsburgh, sheets C18.

Reading, Pa., bars and strip, except 55.50c for Type 309 strip and 44.75c for Type 309 bars, C4.

Sharon, Pa., strip, except Types 303, 309, 316, 416, 501 and 502 S3.

So. Chicago, Ill., bars & structurals U5.

Syracuse, N. Y., bars, wire & structurals C18.

Titusville, Pa., bars, U4.

Wallingford, Conn., strip, except 309, W2 quotes 0.25 cents higher.

Washington, Pa., bars, sheets & strip, except Type 309 sheets 56.00c and bars 44.75c, J3.

Washington, Pa., Types 301 through 347 sheets & strip as listed except 303 & 309; 316 sheets 61.50c, strip 63.00c, W4.

Watervliet, N. Y., structurals & bars A4.

Waukegan, bars & wire A7.

West Leechburg, Pa., strip, A4.

Youngstown, strip, except Types 303, 309, 316, 416, 501 and 502 C8.

COAL CHEMICALS

Spot, cents per gallon, ovens
Pure benzol 30.00-35.00
Toluol, one deg...26.00-33.00
Industrial xylol ..25.00-33.50
Per ton bulk, ovens
Sulphate of ammonia $32-$45
Cents per pound, ovens
Phenol, 40 (carlots, non-returnable drums) ..17.25
Do., less than carlots..18.00
Do., tank cars 15.50

FLUORSPAR

Metallurgical grade, f.o.b. shipping point, in Ill., Ky., net tons, carloads, effective CaF_2 content, 70%, $43; 60%, $40.

Imported, net ton, duty paid, metallurgical grade, $33-$35.

MORE

METAL POWDERS

(Per pound, f.o.b. shipping point in ton lots for minus 100 mesh, except as otherwise noted.)

	Cents
Sponge iron	
98+% Fe, carlots, Swedish, c.i.f. New York, in bags	16.00-18.50
Electrolytic Iron:	
Annealed, 99.5% Fe	42.50
Unannealed, 99 + % Fe	36.50
Unannealed, 99 + % Fe(minus 325 mesh)	58.50
Powder Flakes	48.50
Carbonyl Iron:	
97.9-99.8%, size 5 to 10 microns	83.00-148.00
Aluminum:	
Carlots, freight allowed	29.50
Atomized, 500 lb drums, freight allowed	33.50
Brass, 10-ton lots	30.00-33.25
Bronze, 10-ton lots	51.25-60.00
Phosphor-Copper, 10 tons	50.00
Copper:	
Electrolytic	43.25
Reduced	33.75-37.00
Lead	25.50
Manganese:	
Minus 100-mesh	57.00
Minus 35 mesh	52.00
Minus 200 mesh	62.00
Nickel unannealed	83.00
Nickel-Silver, 10-ton lots	44.00
Silicon	38.50
Solder (plus cost of metal)	8.50
Stainless Steel, 302	83.00
Tin	$1.935
Zinc, 10-ton lots	23.00-30.50
Tungsten:	Dollars
99%, minus 80 to 200 mesh, freight allowed:	
1000 lb and over	4.00
Less than 1000 lb	4.15
98.8% minus 65 mesh, freight allowed:	
1000 lb. and over	4.15
less than 1000 lb	4.25
Molybdenum:	
99%, minus 80 to 200 mesh:	
over 500 lb	2.85
200 to 500 lb	3.10
less than 200 lb	3.25
Chromium, electrolytic 99% Cr min.	3.50

METALLURGICAL COKE

Price per net ton

BEEHIVE OVENS

Connellsvll.fur.	$14.50-15.00
Connellsvll,fdry.	17.00-18.00
New River, foundry	19.50
Wise county, foundry	15.95
Wise county, furnace	15.20

OVEN FOUNDRY COKE

Kearney, N. J., ovens	$22.75
Everett, Mass., ovens	
New England, del.	24.80
Chicago, ovens	21.00
Chicago, del.	22.45
Detroit, del.	24.91
Terre Haute, ovens	22.50
Milwaukee, ovens	23.75
Indianapolis, oven	22.75
Chicago, del.	26.62
Cincinnati, del.	25.65
Detroit, del.	26.65
Ironton, O., ovens	21.50
Cincinnati, del.	24.06
Painesville, O., ovens	24.00
Cleveland, del.	25.72
Erie, Pa., ovens	23.50
Birmingham, ovens	20.30
Birmingham, del.	21.69
Philadelphia, ovens	22.70
Nevillelsland,Pa.,ovens	23.00
Swedeland, Pa., ovens	22.00
St. Louis, ovens	24.25
St. Louis, del.	25.38
Portsmouth, O., ovens	21.50
Cincinnati, del.	24.06
Detroit, ovens	24.00
Detroit, del.	*25.00
Buffalo, del.	26.69
Flint, del.	26.44
Pontiac, del.	25.39
Saginaw, del.	26.75

Includes representative switching charge of: *, $1.00; †, $1.45, one-truck charge being $1.20, two tracks $1.40, and three or more tracks $1.50. ‡ Or within $4.15 freight zone from works.

WAREHOUSE STEEL PRODUCTS

(Prices, cents per pound, for delivery within switching limits, subject to extras)

	SHEETS			STRIP		BARS			Standard Structural Shapes	PLATES	
	H.R. 18 Ga., Heavier*	C.R.	Gal. 10 Ga.†	H.R.*	C.R.*	H.R. Rds.	C.F. Rds.	H.R. Alloy 4140‡		Carbon	Floor
New York (city)	6.27	7.29	8.44	6.59	...	6.42	7.29	9.25	6.40	6.58	8.04
New York (c'try)	5.97	6.99	8.14	6.29	...	6.12	6.99	8.95	6.10	6.28	7.74
Boston (city)	6.40	7.20	8.49	6.35	...	6.25	7.04	9.25	6.40	6.98	7.88
Boston (c'try)	6.20	7.00	8.29	6.15	...	6.05	6.84	9.05	6.20	6.78	7.68
Phila. (city)	7.15	7.05	8.25	6.35	...	6.30	7.11	8.90	6.15	6.30	7.40
Phila. (c'try)	6.90	6.80	8.00	6.10	...	6.05	6.86	8.65	5.90	6.05	7.15
Balt. (city)	5.80	7.04	8.27	6.24	...	6.24	7.09	...	6.34	6.00	7.64
Balt. (c'try)	5.60	6.84	8.07	6.04	...	6.04	6.89	...	6.14	5.80	7.44
Norfolk, Va.	6.50	...	...	6.70	...	6.55	7.70	...	6.60	6.50	8.00
Richmond, Va.	5.90	...	8.10	6.10	...	6.10	6.90	...	6.30	6.05	7.80
Wash. (w'hse)	6.02	7.26	8.49	6.46	...	6.46	7.26	...	6.56	6.22	7.86
Buffalo (del.)	5.80	6.60	8.29	6.06	...	5.80	6.65	10.65††§	6.00	6.25	7.55
Buffalo (w'hse)	5.60	6.40	8.09	5.86	...	5.60	6.45	10.45††§	5.80	6.05	7.35
Pitts. (w'hse)	5.60	6.40*	7.75	5.65-5.95	6.90	5.55	6.40	10.10††	5.70	5.75	7.00
Detroit (w'hse)	5.45-5.78	6.53-6.80	7.99	5.94-5.95	7.75	5.84	6.56	8.91	6.09	6.19-6.35	7.28
Cleveland (del.)	5.80	6.60	8.30	5.89	7.10	5.77	6.60-6.70	8.91	10.02	6.12	7.32
Cleve. (w'hse)	5.60	6.40	8.10	5.69	6.90	5.57	6.40-6.50	8.71	5.82	5.92	7.12
Cincin. (city)	6.02	6.59	7.34	5.95	...	5.95	6.51	...	6.24	6.34	7.50
Chicago (city)	5.80	6.60	7.95	5.75	...	5.75	6.50	10.30	5.90	6.00	7.20
Chicago (w'hse)	5.60	6.40	7.75	5.55	...	5.55	6.30	10.10	5.70	5.80	7.00
Milwaukee (city)	5.94	6.74	8.09	5.89	...	5.89	6.74	10.44	6.04	6.14	7.34
Milwau. (c'try)	5.74	6.54	7.89	5.69	...	5.69	6.54	10.24	5.84	5.94	7.14
St. Louis (del.)	5.68	6.48	7.28	5.63	...	5.63	6.28	10.08††§	5.78	5.93	7.13
St. L. (w'hse)	5.48	6.28	7.08	5.43	...	5.43	6.08	9.88††§	5.58	5.73	6.93
Kans. City (city)	6.40	7.20	8.40	6.35	...	6.35	7.20	...	6.50	6.60	7.80
KansCity (w'hse)	6.20	7.00	8.20	6.15	...	6.15	7.00	...	6.30	6.40	7.60
Omaha, Nebr.	6.13‡	...	8.33	6.13	...	6.18	6.98	...	6.18	6.38	7.83
Birm'hm (city)	5.75	6.55	6.90[2]	5.70	...	5.70	7.53	...	5.85	6.10	8.25
Birm'hm (w'hse)	5.60	6.40	6.75[2]	5.55	...	5.55	7.53	...	5.70	5.95	8.23
Los Ang. (city)	6.55	8.10	9.05[3]	6.60	8.90	6.55	7.75	...	6.55	6.60	9.20
L. A. (w'hse)	6.35	7.90	8.85[3]	6.40	8.70	6.35	7.55	...	6.35	6.40	8.70
San Francisco	6.65	7.80[4]	8.90[3]	6.60	...	6.45	8.20	...	6.45	6.50	8.60
Seattle-Tacoma	7.05	8.60[3]	9.20[3]	7.30	...	6.75	9.10	11.15	6.65	6.75	8.80

* Prices do not include gage extras; † prices include gage and coating extras, except Birmingham (coating extra excluded) and Los Angeles (gage extra excluded; ‡ includes extra for 10 gage; § as rolled; †† as annealed. Base quantities, 2000 to 9999 lb except as noted: Cold-rolled strip, 2000 lb and over; cold-finished bars, 2000 lb and over; [2]—500 to 1499 lb; [3]—450 to 1499 lb; [4]—3500 lb and over; [5]—1000 to 1999 lb.

REFRACTORIES

FIRE CLAY BRICK

Super Duty: St. Louis, Vandalia, Farber, Mexico, Mo., Olive Hill, Hayward, Ashland, Ky., Clearfield, Curwensville, Pa., Ottawa, Ill., $116.60. Hard-fired, St. Louis, Vandalia, Mo., Olive Hill, Ky., $156.20.

High-Heat Duty: Salina, Pa. $99.60. Woodbridge, N. J., St. Louis, Farber, Vandalia, Mexico, Mo., West Decatur, Orviston, Clearfield, Beach Creek, Curwensville, Lumber, Lockhaven, Pa., Olive Hill, Hitchins, Haldeman, Ashland, Ky., Troup, Athens, Tex., Stevens Pottery, Ga., Bessemer, Ala., Portsmouth, Oak Hill, O., Ottawa, Ill., $94.60.

Intermediate-Heat Duty: St. Louis, Farber, Vandalia, Mo., West Decatur, Orviston, Beach Creek, Curwensville, Lumber, Lockhaven, St. Marys, Clearfield, Pa., Olive Hill, Hitchins, Haldeman, Ashland, Hayward, Ky., Athens, Troup, Tex., Stevens Pottery, Ga., Portsmouth, O., Ottawa, Ill., $88; Bessemer, Ala., $79.20.

Low-Heat Duty: Oak Hill, or Portsmouth, O., Clearfield, Orviston, Pa., $79.20; Parral, O., $78.50; St. Marys, Pa., $76; Ottawa, Ill., $70.

LADLE BRICK

Dry Press: Chester, New Cumberland, W. Va., Freeport, Merill Station, Clearfield, Pa., Irondale, Wellsville, O., $66.

Wire Cut: Chester, Wellsville, O., $64.

MALLEABLE BUNG BRICK

St. Louis, Vandalia, Farber, Mo., Olive Hill, Ky., $105.60; Beach Creek, Pa., $94.60; Ottawa, Ill., $90.

SILICA BRICK

Mt. Union, Claysburg, or Sproul, Pa., Portsmouth, O., Ensley, Ala., $94.60; Hays, Pa., $100.10; Joliet, Rockdale, Ill., E. Chicago, Ind., $104.50; Lehi, Utah, Los Angeles, $111.10.

Eastern Silica Coke Oven Shapes (net ton): Claysburg, Mt. Union, Sproul, Pa., Birmingham, $92.40.

Illinois Silica Coke Oven Shapes (net ton): Joliet or Rockdale, Ill., E. Chicago, Ind., Hays, Pa., $93.50.

BASIC BRICK

Per net ton, Baltimore or Chester, Pa. Burned chrome brick, $73-$78; chemical-bonded chrome brick, $77-$82; magnesite brick, $99-$104; chemical-bonded magnesite, $88-$93.

MAGNESITE

Per net ton, Chewelah, Wash. Domestic deadburned, ¾" grains; bulk, $36.30; single paper bags, $41.80.

DOLOMITE

Per net ton. Domestic, burned bulk; Bonne Terre, Mo., $12.15; Martin, Millersville, Narlo, Clay Center, Woodville, Gibsonburg, Bettsville, O., Billmeyer, Plymouth Meeting, Blue Bell, Williams, Pa., Millville, W. Va., $13.

ORES

LAKE SUPERIOR IRON ORE

Gross ton, 51½% (natural), lower lake ports.

After adjustment for analysis, prices will be increased or decreased as the case may be for increases or decreases after Dec. 2, 1950, in applicable lake vessel rates, upper lake rail freights, dock handling charges and taxes thereon.

Old range bessemer	$8.70
Old range nonbessemer	8.55
Mesabi bessemer	8.45
Mesabi nonbessemer	8.30
High phosphorus	8.30

EASTERN LOCAL ORE

Cents per unit, del. E. Pa.

Foundry and basic 56-62% concentrates contract	17.00

FOREIGN ORE

Cents per unit, c.i.f. Atlantic ports

Swedish basic, 60 to 68%:	
Spot	17.00
Long-term contract	15.00
North African hematites	15.75
Brazilian iron ore, 68-69%	18.00

TUNGSTEN ORE

Net ton unit, duty paid

Foreign wolframite and scheelite, per net ton unit	$38-$39
Domestic scheelite, del.	nominal

MANGANESE ORE

Indian manganese, 46-48%, nearby, 92.00-96.00c per long ton unit, c.i.f. U. S. ports, duty for buyer's account; shipments against old contracts for 48% ore are being received from some sources at 79.8-81.8c.

CHROME ORE

Gross ton, f.o.b. cars, New York, Philadelphia, Baltimore, Charleston, S. C., plus ocean freight differential for delivery to Portland, Oreg., or Tacoma, Wash.

Indian and African	
48% 2.8:1	$32.50
48% 3:1	35.00-36.00
48% no ratio	26.00
South African Transvaal	
44% no ratio	$24.00-25.00
45% no ratio	20.00
48% no ratio	31.00-32.00
50% no ratio	28.00-28.50
Brazilian	
44% 2.5:1 lump	$32.00
Rhodesian	
45% no ratio	$20.00-21.00
48% no ratio	26.00
48% 3:1 lump	35.00-36.00
Domestic—rail nearest seller	
48% 3:1	$39.00

MOLYBDENUM

Sulphide concentrates per lb. molybdenum content, mines	$0.90

FERROALLOYS

MANGANESE ALLOYS

Spiegeleisen: (19-21% Mn, 1-3% Si). Carlot per gross ton, $75, Palmerton, Pa.; $75, Pittsburgh and Chicago; (16% to 19% Mn) $1 per ton lower.

Standard Ferromanganese: (Mn 78-82%, C 7% approx.) Carload, lump, bulk $185 per gross ton of alloy, c.l. packed, $197; gross ton lots, packed, $212; less gross ton lots, packed, $229; f.o.b. Alloy, W. Va., Niagara Falls, N. Y., Welland, Ont., or Ashtabula, O. Base price: $187, Johnstown, Pa.; $185, Sheridan, Pa.; $188, Etna, Pa.; $190, Chattanooga, Tenn. Shipment from Pacific Coast warehouses by one seller add $33 to above prices, f.o.b. Los Angeles, Oakland, Portland, Oreg. Shipment from Chicago warehouse, ton lots $227; less gross ton lots, $244 f.o.b. Chicago. Add or subtract $2.30 for each 1% or fraction thereof, of contained manganese over 82% and under 78%, respectively.

Low-Carbon Ferromanganese, Regular Grade: (Mn 85-90%). Carload, lump, bulk, max. 0.07% C, 25.75c per lb of contained Mn, carload packed 26.5c, ton lot 27.6c, less ton 28.8c. Delivered. Deduct 0.5c for max. 0.15% C grade from above prices, 1c for max. 0.30% C, 1.5c for max. 0.50% C, and 4.5c for max. 75% C—max. 7% Si. **Special Grade:** (Mn 90% min., C 0.07% max., P 0.06% max.). Add 0.5c to above prices. Spot, add 0.25c.

Medium-Carbon Ferromanganese: (Mn 80-85%, C 1.5% max.). Carload, lump, bulk 19.15c per lb of contained Mn, carload packed 19.9c, ton lot 21.0c, less ton 22.2c. Delivered. Spot, add 0.25c.

Manganese Metal, 2" x D (Mn 96% min., Fe 2% max., Si 1% max., C 0.2% max.): Carload lump bulk, 34c per lb of metal; packed, 34.75c; ton lot 36.25c; less ton lot 38.25c. Delivered. Spot, add 2c.

Manganese Electrolytic: 250 lb to 1999 lb, 32c; 2000 to 39,999 lb, 30c; 40,000 lb or more, 28c. Premium for hydrogen-removed metal 1.5c per pound, f.o.b. cars Knoxville, Tenn. Freight allowed to St. Louis or to any point east of Mississippi.

Silicomanganese: (Mn 65-68%). Contract, lump bulk, 1.50% C grade, 18-20% Si 9.90c per lb of alloy, carload packed, 10.65c, ton lot 11.55c, less ton 12.55c. Freight allowed. For 2% C grade, Si 15-17%, deduct 0.2c from above prices. For 3% C grade, Si 12-14.5%, deduct 0.5c from above prices. Spot, add 0.25c.

CHROMIUM ALLOYS

High-Carbon Ferrochrome: Contract, c.l., lump, bulk 21.75c per lb of contained Cr, c.l., packed 22.65c, ton lot 23.80c, less ton 25.20c. Delivered. Spot, add 0.25c.

"SM" Ferrochrome: (Cr 60-65% Si 4-6%, Mn

(*Please turn to page 164*)

The Metal Market

Smaller tonnages of major nonferrous metals will be available for civilian goods in second quarter as military demands mount and producers' stocks shrink

COPPER fabricators' supply position is deteriorating rapidly. In recognition of this, several large interests are urging discontinuance of stockpiling of the metal by the government and an immediate suspension in the 2-cent tariff. C. Donald Dallas, chairman, Revere Copper & Brass Inc., says copper is the most critical of the major metals from the standpoint of supply and the "most severely limiting factor on the nation's ability to superimpose large scale military production on a high level of civilian production. Nearly every industry needs copper. It is essential to the manufacture of nearly all durable goods. More copper is urgently needed."

At the end of February, fabricators had a net deficit of 232,675 tons of copper. During that month, they consumed 117,998 tons while they received only 99,630 tons from primary producers. Their stocks of refined copper dropped 20,109 tons to 248,593 tons, or 41,119 tons short of the 289,712 tons which they calculate as required for a working stock. At the same time unfilled orders on their books increased to a total of 285,930 tons.

Part of the shortage in copper products is attributed to the fact that fabricators' price structure will not permit paying the excessive prices demanded for scrap and, even at the inflated prices, adequate supplies of scrap are unavailable in the market. A substantial portion of metal which goes into fabricated products is customarily obtained from scrap.

DO's Fail To Get Zinc

If you are having difficulty in obtaining zinc for delivery over the next two months, you are only one of a large group of industrialists with the same problem. Many consumers have not been able to obtain zinc even with DO ratings, indicating the extreme scarcity of the metal. Several thousand tons of all grades of zinc are involved in these unplaced orders.

Watch for an order providing for allocation of zinc in the second quarter to relieve such distress cases. Government officials also are studying the proposal for issuing a special regulation for the die casting industry simultaneously with the proposed manufacturers' pricing regulation.

Lead Supply Tightens

Battery manufacturers and cable makers, as well as other large users of lead, are finding it increasingly difficult to secure this metal to meet projected production schedules. They are now awaiting the opening of May books, since no additional offerings of lead for April delivery are being made. Supplies for May again will be inadequate to meet demand.

Shipments of refined lead to domestic consumers declined slightly in the short month of February to 49,128 tons from 51,260 tons in January and compared with 21,855 tons in February, 1950. Refiners now must depend almost entirely on current production for their customers' needs, since stocks amount to only 27,775 tons against 79,143 tons a year ago. Since the first of the year when the tariff was doubled, imports have been small.

Doubling of the tariff on Jan. 1 reduced imports sharply, depriving consumers of an important source of metal. Buyers abroad are paying up to 20.50c, f.a.s. Gulf ports, while consumers in this country are prohibited from paying more than 17.00c, New York.

Less Aluminum for Civil Uses

Manufacturers engaged in production of civilian goods will receive less aluminum beginning Apr. 1 than they did in the first quarter notwithstanding a steady rise in production. An amendment to order M-5 requires an additional 15 per cent reserve by aluminum producers or fabricators and an additional 20 per cent by distributors and jobbers of aluminum products for filling defense-rate orders. An aluminum producer or fabricator must accept DO rated orders for shipment in any one month up to the listed percentages of his average monthly shipments of such products during the first eight months of 1950: Forgings and pressings, 75 per cent; extrusions and tubing, 60 per cent; secondary ingots, 60 per cent; plates, circles and blanks, 55 per cent; casting, 55 per cent; rod, bar, wire and cable, 50 per cent; rolled shapes, 45 per cent; and all other mill products, 55 per cent, each.

Tin Advances to $1.46

Reconstruction Finance Corp. advanced its selling price 12 cents a pound to $1.46 a pound on Thursday, Mar. 29. An RFC official says the agency is not basing its price on the market quotation at Singapore. He says the RFC will continue to quote on a daily basis. The agency is still out of the market as a bulk buyer for the government's stockpile.

Aluminum Supply Improves

Supplies of aluminum continue extremely tight and will continue so for many months. This is indicated by the latest report issued by the Bureau of Mines, showing that production per day in February was only slightly more than in January. Domestic production of primary aluminum in February totaled 62,740 tons or a drop of 5214 tons from the January total of 67,954 tons. Results of the industry's expansion program are beginning to be reflected, however, with the total for the first two months this year showing a gain of about 27 per cent over the like 1950 period.

Shipments were 1503 tons less than production, bringing the inventory at the end of February to 14,445 tons.

Larger tonnages of imported metal are available, but at advancing prices. Net imports of primary metal in February were 142 per cent of the 1950 monthly average.

NEED COPPER?: Here is a government stockpile of copper bars and cathodes at a storage area, but there's none for sale. Stockpiling is a hedge against shortages of raw stocks for munitions in times when production can no longer meet essential needs requirements. Military uses for copper range electronics equipment to fungicides

NONFERROUS METALS

(Cents per pound, carlots, except as otherwise noted)

Primary Metals

Copper: Electrolytic 24.50c, Conn. Valley; Lake 24.62½c, delivered.

Brass Ingots: 85-5-5-5 (No. 115) 29.00c; 80-10-10 (No. 215) 44.50c; 80-10-10 (No. 305) 39.00c; No. 1 yellow (No. 405) 25.50c.

Zinc: Prime western 17.50c; brass special 17.75c; intermediate 18.00c, East St. Louis; high grade 18.85c, delivered.

Lead: Common 16.80c; chemical 16.90c; corroding 16.90c, St. Louis.

Primary Aluminum: 99% plus, ingots 19.00c, pigs 18.00c. **Base prices** for 10,000 lb and over. Freight allowed on 500 lb or more but not in excess of rate applicable on 30,000 lb c.l. orders.

Secondary Aluminum: Piston alloys 30.00-32.00c; No. 12 foundry alloy (No. 2 grade) 29.75-31.50c; steel deoxidizing grades, notch bars, granulated or shot: Grade 1, 32.75-33.50c; grade 2, 30.00-31.50c; grade 3, 30.00-30.50c; grade 4, 28.50-30.00c. Prices include freight at c.l. rate up to 75 cents per 100 lb.

Magnesium: Commercially pure (99.8%) standard ingots, 10,000 lb and over 24.50c, f.o.b. Freeport, Tex.

Tin: Grade A, prompt 146.00.

Antimony: American 99-99.8% and over but not meeting specifications below 42.00c; 99.8% and over (arsenic 0.05% max.; other impurities 0.1% max.) 42.50; f.o.b. Laredo, Tex., for bulk shipments.

Nickel: Electrolytic cathodes, 99.9%, base sizes at refinery, unpacked, 50.50c; 25-lb pigs, 53.15c; "XX" nickel shot, 54.15c; "F" nickel shot or ingots, for addition to cast iron, 51.00c. Prices include import duty.

Mercury: Open market, spot, large lots, New York, $216-$220 per 76-lb flask.

Beryllium-Copper: 3.75-4.25% Be, $1.56 per lb of alloy, f.o.b., Reading, Pa.

Cadmium: "Regular" straight or flat forms, $2.55 del.; special or patented shapes $2.80.

Cobalt: 97.99%, $2.10 per lb for 500 lb (kegs); $2.12 per lb for 100 lb (case); $2.17 per lb under 100 lb.

Gold: U. S. Treasury, $35 per ounce.

Silver: Open market, New York 90.16c per oz.

Platinum: $90-$93 per ounce from refineries.

Palladium: $24 per troy ounce.

Iridium: $200 per troy ounce.

Titanium (sponge form): $5 per pound.

Rolled, Drawn, Extruded Products

COPPER AND BRASS

(Base prices, cents per pound, f.o.b. mill)

Sheet: Copper 41.03; yellow brass 37.84; commercial bronze, 95%, 40.99; 90%, 40.55; red brass, 85%; 39.59; 80%, 39.15; best quality, 39.15; nickel silver, 18%, 51.91-52.36; phosphor-bronze grade A, 5%, 60.20-62.82.

Rod: Copper, hot-rolled 36.88; cold-drawn 38.13; yellow brass free cutting, 32.23; commercial bronze, 95%, 40.68; 90%, 40.24; red brass 85%, 39.28; 80%, 38.84.

Seamless Tubing: Copper 41.07; yellow brass 40.85; commercial bronze, 90%, 43.21; red brass, 85% 42.50.

Wire: Yellow brass 38.13; commercial bronze, 95%, 41.28; 90%, 40.84; red brass, 85%, 39.88; 80%, 39.44; best quality brass, 39.44.

Copper Wire: Bare, soft, f.o.b. eastern mills, c.l. 28.67-30.295; l.c.l. 29.17-30.92; 100,000 lb lots 28.545-30.295; weatherproof, f.o.b. eastern mills, c.l. 30.10, l.c.l. 30.18, 100,000 lb lots 29.35; magnet, del., 15,000 lb or more 34.50, l.c.l. 35.25.

ALUMINUM

(30,000 lb base; freight allowed on 500 lb or more, but not in excess of rate applicable on 30,000 lb c.l. orders.)

Sheets and Circles: 2S and 3S mill finish c.l.

Thickness Range, Inches	Widths or Diameters, In., Incl.	Flat Sheet Base*	Coiled Sheet Base	Coiled Sheet Circle† Base
0.249-0.136	12-48	30.1	...	...
0.135-0.096	12-48	30.6	...	...
0.095-0.077	12-48	31.2	29.1	33.2
0.076-0.061	12-48	31.8	29.3	33.4
0.060-0.048	12-48	32.1	29.5	33.7
0.047-0.038	12-48	32.5	29.8	34.0
0.037-0.030	12-48	32.9	30.2	34.6
0.029-0.024	12-48	33.4	30.5	35.0
0.023-0.019	12-36	34.0	31.1	35.7
0.018-0.017	12-36	34.7	31.7	36.6
0.016-0.015	12-36	35.5	32.4	37.6
0.014	12-24	36.5	33.3	38.9
0.013-0.012	12-24	37.4	34.0	39.7
0.011	12-24	38.4	35.0	41.2
0.010-0.0095	12-24	39.4	36.1	42.7
0.009-0.0085	12-24	40.6	37.2	44.4
0.008-0.0075	12-24	41.9	38.4	46.1
0.007	12-18	43.3	39.7	48.2
0.006	12-18	44.8	41.0	52.8

* Lengths 72 to 180 inches. † Maximum diameter, 26 inches.

Screw Machine Stock: 5000 lb and over.

Diam. (in.) or distance across flats	—Round— R317-T4,	—Hexagonal— R317-T4	17S-T4
0.125	32.0	...	...
0.156-0.188	44.0	...	...
0.219-0.313	41.5	...	...
0.375	40.0	46.0	48.0
0.406	40.0	...	...
0.438	40.0	46.0	48.0
0.469	40.0	...	...
0.500	40.0	46.0	48.0
0.531	40.0	...	...
0.563	40.0	...	45.0
0.594	40.0	...	...
0.625	40.0	43.5	45.0
0.688	40.0	...	45.0
0.750-1.000	39.0	41.0	42.5
1.063	39.0	...	41.0
1.125-1.500	37.5	39.5	41.0
1.563	37.0	...	...
1.625	36.5	...	39.5
1.688-2.000	36.5	...	...

LEAD

(Prices to jobbers, f.o.b. Buffalo, Cleveland, Pittsburgh) Sheets: Full rolls, 140 sq ft or more $22.00 per cwt; add 50c cwt 10 sq ft to 140 sq ft. Pipe: Full coils $22.00 per cwt. Traps and bends: List prices plus 60%.

ZINC

Sheets, 24.50c, f.o.b. mill 36,000 lb and over. Ribbon zinc in coils, 23.00c, f.o.b. mill, 36,000 lb and over. Plates, not over 12-in., 23.50-24.50c; over 12-in., 23.50-24.50c.

"A" NICKEL

(Base prices f.o.b. mill)

Sheets, cold-rolled, 71.50c. Strip, cold-rolled 77.50c. Rods and shapes, 67.50c. Plates, 69.50c. Seamless tubes, 100.50c.

MONEL

(Base prices, f.o.b. mill)

Sheets, cold-rolled 57.00c. Strip, cold-rolled 60.00c. Rods and shapes, 55.00c. Plates, 56.00c. Seamless tubes, 90.00c. Shot and blocks, 50.00c.

MAGNESIUM

Extruded Rounds, 12 in. long, 1.31 in. in diameter, less than 25 lb, 55.00-62.00c; 25 to 99 lb, 45.00-52.00c; 100 lb to 5000 lb, 41.00c.

TITANIUM

(Prices per lb, 10,000 lb and over, f.o.b. mill) Sheets, $15; sheared mill plate, $12; strip, $15; wire, $10; forgings, $6; hot-rolled and forged bars, $6.

Plating Materials

Chromic Acid: 99.9% flake, f.o.b. Philadelphia, carloads, 27.00c; 5 tons and over 27.50c; 1 to 5 tons, 28.00c; less than 1 ton 28.50c.

Copper Anodes: Base 2000 to 5000 lb; f.o.b. shipping point, freight allowed: Flat untrimmed 37.69c; oval 37.19c. Cast .37.375c, delivered in eastern territory.

Copper Cyanide: 70-71% Cu, 100-lb drums, 1000 lb 60.8c, under 1000 lb 62.8c, f.o.b. Niagara Falls, N. Y.

Sodium Cyanide: 96-98% ½-oz ball, in 200 lb drums, 1 to 900 lb, 19.00c; 1000 to 19,900 lb, 18.00c, f.o.b. Niagara Falls, N. Y. Packaged in 100 lb drums add ½-cent.

Copper Carbonate: 54-56% metallic Cu; 50 lb bags, up to 200 lb, 29.25c; over 200 lb 28.25c, f.o.b. Cleveland.

Nickel Anodes: Rolled oval, carbonized, carloads, 68.50c; 10,000 to 30,000 lb, 69.50c; 3000 to 10,000 lb, 70.50c, 500 to 3000 lb 71.50c; 100 to 500 lb, 73.50c; under 100 lb, 76.50c, f.o.b. Cleveland.

Nickel Chloride: 100-lb kegs, 35.00c; 400-lb bbl, 33.00c up to 10,000 lb, 32.50c; over 10,000 lb, f.o.b. Cleveland, freight allowed on barrels, or 4 or more kegs.

Tin Anodes: Bar, 1000 lb and over, nom.; 500 to 999 lb, nom.; 200 to 499 lb, nom.; less than 200 lb, nom.; ball, 1000 lb and over, nom.; 500 to 999 lb, nom.; 200 to 499 lb, nom.; less than 200 lb, nom.; f.o.b. Sewaren, N. J.

Sodium Stannate: 25 lb cans only, less than 100 lb, to consumers nom.; 100 or 300 lb drums only, 100 to 500 lb, nom.; 600 to 1900 lb, nom.; 2000 to 9900 lb, nom.; f.o.b. Sewaren, N. J. Freight not exceeding St. Louis rate allowed.

Zinc Cyanide: 100 lb drums, less than 10 drums 47.7c, 10 or more drums, 45.7c, f.o.b. Niagara Falls, N.Y.

Stannous Sulphate: 100 lb kegs or 400 lb bbl, less than 2000 lb nom.; more than 2000 lb, nom., f.o.b. Carteret, N. J.

Stannous Chloride (Anhydrous): In 400 lb bbl, nom.; 100 lb kegs nom., f.o.b. Carteret, N. J.

Scrap Metals

BRASS MILL ALLOWANCES

Prices in cents per pound for less than 20,000 lb, f.o.b. shipping point.

	Clean Heavy	Rod Ends	Clean Turnings
Copper	23.00	23.00	22.25
Yellow Brass	20.125	19.875	18.75
Commercial Bronze			
95%	21.875	21.625	21.125
90%	21.75	21.50	21.00
Red Brass			
85%	21.50	21.25	20.75
80%	21.375	21.125	20.625
Muntz metal	19.00	18.75	18.25
Nickel, silver, 10%	22.25	22.00	11.125
Phos. bronze, A	24.00	23.75	22.75

BRASS INGOT MAKERS' BUYING PRICES

(Cents per pound, delivered eastern refineries, carload lots)

No. 1 copper 29.00; No. 2 copper 26.00; light copper 24.75; composition red brass 24.50-25.00; radiators 19.50; heavy yellow brass 19.50.

REFINERS' BUYING PRICES

(Cents per pound, delivered refinery, carload lots)

No. 1 copper 21.50*; No. 2 copper 20.00*; light copper 19.00*; refinery brass (60% copper) per dry copper content 20.00.

* Nominal.

DEALERS' BUYING PRICES

(Cents per pound, New York, in ton lots)

Copper and brass: Heavy copper and wire, No. 1 25.50; No. 2 24.00, light copper 22.00; No. 1 composition red brass 21.50-22.00; No. 1 composition turnings 20.50-21.00; mixed brass turnings 13.00; new brass clippings 19.00-20.00; No. 1 brass rod turnings 18.00; light brass 15.00; clean heavy yellow brass 17.00; new brass rod ends 18.50; auto radiators 17.00-17.25; cocks and faucets, 18.00-18.50; brass pipe 19.00-19.50.

Lead: Heavy 16.00-16.50; battery plates 9.50-10.00; linotype and stereotype 17.00; electrotype 15.75-16.00; mixed babbitt 17.00.

Zinc: Old zinc 11.50-12.00; new die cast scrap 11.50-12.00; old die cast scrap 8.00-8.25.

Tin: No. 1 pewter 80.00-85.00; block tin pipe 100.00-110.00; No. 1 babbitt 70.00-75.00.

Aluminum: Clippings 2S 20.00; old sheets 16.00; crankcase 16.00; borings and turnings 12.00.

DAILY PRICE RECORD

1951	Copper	Lead	Zinc	Tin	Aluminum	Antimony	Nickel	Silver
Mar. 29	24.50	16.80	17.50	146.00	19.00	42.00	50.50	90.16
Mar. 13-28	24.50	16.80	17.50	134.00	19.00	42.00	50.50	90.16
Mar. 12	24.50	16.80	17.50	*	19.00	42.00	50.50	90.16
Mar. 9-10	24.50	16.80	17.50	134.00	19.00	42.00	50.50	90.16
Mar. 8	24.50	16.80	17.50	139.00	19.00	42.00	50.50	90.16
Mar. 7	24.50	16.80	17.50	160.00	19.00	42.00	50.50	90.16
Mar. 6	24.50	16.80	17.50	174.50	19.00	42.00	50.50	90.16
Mar. 5	24.50	16.80	17.50	179.50	19.00	42.00	50.50	90.16
Mar. 2-3	24.50	16.80	17.50	181.75	19.00	42.00	50.50	90.16
Mar. 1	24.50	16.80	17.50	181.50	19.00	42.00	50.50	90.16
Feb. Avg.	24.50	16.80	17.50	182.716	19.00	42.00	50.50	90.16

* Nominal.

NOTE: Copper; Electrolytic, del. Conn. Valley; Lead, common grade, del. St. Louis; Zinc, prime western, E. St. Louis; Tin, Straits, del. New York; Aluminum primary ingots, 99%, del.; Antimony, bulk, f.o.b. Laredo, Tex.; Nickel, electrolytic cathodes, 99.9%, base sizes at refinery unpacked; Silver, open market, New York. Prices, cents per pound; except silver, cents per ounce.

CEILING PRICES, IRON AND STEEL SCRAP

Prices as set forth in Office of Price Stabilization ceiling price regulation No. 5, effective Feb. 7, 1951.

STEELMAKING SCRAP COMPOSITE

Mar. 29	$44.00
Mar. 22	44.00
Feb. 1951	44.00
Mar. 1950	28.23
Mar. 1946	19.17

Based on No. 1 heavy melting grade at Pittsburgh, Chicago and eastern Pennsylvania.

Basing point ceiling prices per gross ton from which maximum shipping prices are computed on scrap of dealer and industrial origin; and from which ceiling on-line and ceiling delivered prices are computed on scrap of railroad origin.

No. 1 Heavy Melting Steel (Grade 1)

Basing Point	Dealer, Industrial	Railroad
Alabama City, Ala.	$39.00	$41.00
Ashland, Ky.	42.00	44.00
Atlanta, Ga.	39.00	41.00
Bethlehem, Pa.	42.00	44.00
Birmingham, Ala.	39.00	41.00
Brackenridge, Pa.	44.00	46.00
Buffalo, N. Y.	43.00	45.00
Butler, Pa.	44.00	46.00
Canton, O.	44.00	46.00
Chicago, Ill.	42.50	44.50
Cincinnati, O.	43.00	45.00
Claymont, Del.	42.50	44.50
Cleveland, O.	43.00	45.00
Coatesville, Pa.	42.50	44.50
Conshohocken, Pa.	42.50	44.50
Detroit, Mich.	*41.15*	*43.15*
Duluth, Minn.	40.00	42.00
Harrisburg, Pa.	42.50	44.50
Houston, Tex.	37.00	39.00
Johnstown, Pa.	44.00	46.00
Kansas City, Mo.	39.50	41.50
Kokomo, Ind.	42.00	44.00
Los Angeles	35.00	37.00
Middletown, O.	43.00	45.00
Midland, Pa.	44.00	46.00
Minnequa, Colo.	38.00	40.00
Monessen, Pa.	44.00	46.00
Phoenixville, Pa.	42.50	44.50
Pittsburg, Calif.	35.00	37.00
Pittsburgh, Pa.	44.00	46.00
Portland, Oreg.	35.00	37.00
Portsmouth, O.	42.00	44.00
St. Louis, Mo.	41.00	43.00
San Francisco	35.00	37.00
Seattle, Wash.	35.00	37.00
Sharon, Pa.	44.00	46.00
Sparrows Point, Md.	42.00	44.00
Steubenville, O.	44.00	46.00
Warren, O.	44.00	46.00
Weirton, W. Va.	44.00	46.00
Youngstown, O.	44.00	46.00

Differentials from Base

Differentials per gross ton above or below the price of Grade 1 (No. 1 heavy melting steel) for other grades of dealer and industrial scrap.

Open-hearth and Blast Furnace Grades

2. No. 2 Heavy Melting	—$2.00
3. No. 1 Busheling	Base
4. No. 1 Bundles	Base
5. No. 2 Bundles	— 3.00
6. Machine Shop Turnings	—10.00
7. Mixed Borings & Short Turnings	— 6.00
8. Shoveling Turnings	— 6.00
9. No. 2 Busheling	— 4.00
10. Cast Iron Borings	— 6.00

Electric Furnace and Foundry Grades

11. Billet, Bloom & Forge Crops	+ 7.50
12. Bar Crops & Plate Scrap	+ 5.00
13. Cast Steel	+ 5.00
14. Punchings & Plate Scrap	+ 2.50
15. Electric Furnace Bundles	+ 2.00
Cut Structurals & Plate:	
16. 3 feet and under	+ 3.00
17. 2 feet and under	+ 5.00
18. 1 foot and under	+ 6.00
19. Briquetted Cast Iron Borings	Base
20. Foundry Steel, 2 feet and under	+ 2.00
21. Foundry Steel, 1 foot and under	+ 4.00
22. Springs and Crankshafts	+ 1.00
23. Alloy Free Turnings	— 3.00
24. Heavy Turnings	— 1.00

Special Grades

25. Briquetted Turnings	Base
26. No. 1 Chemical Borings	— 3.00
27. No. 2 Chemical Borings	— 4.00
28. Wrought Iron	+10.00
29. Shafting	+10.00

Restrictions on Use

(1) Prices for Grades 11, 23 and 24 may be charged only when shipped to a consumer directly from an industrial producer of such grades; otherwise ceiling prices shall not exceed prices established for the corresponding grades of basic open-hearth and blast furnace scrap.

(2) Prices established for Grades 26 and 27 may be charged only when such grades are sold for use for chemical or annealing purposes; otherwise ceiling prices for such grades shall not exceed the price established for Grade 10.

(3) Prices established for Grade 28 may be charged only when sold to a producer of wrought iron; otherwise ceiling price for such grade shall not exceed the ceiling price established for the corresponding grade of basic open-hearth.

Special Pricing Provisions

(1) Sellers of Grades 26 and 27 may make an extra charge of $1.50 per ton for loading in box cars, or 75 cents per ton for covering gondola cars with a weather-resistant covering.

(2) Ceiling price of pit scrap, ladle scrap, salamander scrap, skulls, skimmings or scrap recovered from slag dumps and prepared to charging box size, shall be computed by deducting from the price of No. 1 heavy melting steel of dealer and industrial origin, the following amounts: Where iron content is 85% and over, $4; 75% and over, $6; less than 75%, $10.

(3) Ceiling price of any inferior grade of scrap not listed shall not exceed the price of No. 1 heavy melting steel less $15.

Differentials from Base

Differentials per gross ton above or below the price of Grade 1 (No. 1 railroad heavy melting steel) for other grades of railroad steel scrap.

2. No. 2 Heavy Melting Steel	—$2.00
3. No. 2 Steel Wheels	—Base
4. Hollow Bored Axles	Base
5. No. 1 Busheling	— 3.50
6. No. 1 Turnings	— 3.00
7. No. 2 Turnings, Drillings & Borings	—12.00
8. No. 2 Cast Steel	— 6.00
9. Uncut Frogs, switches	Base
10. Flues, Tubes & Pipes	— 8.00
11. Structural, Wrought Iron and/or steel, uncut	— 6.00
12. Destroyed Steel Cars	— 8.00
13. No. 1 Sheet Scrap	— 9.50
14. Scrap Rails, Random Lengths	+ 2.00
15. Rerolling Rails	+ 7.00
Cut Rails:	
16. 3 feet and under	+ 5.00
17. 2 feet and under	+ 6.00
18. 18 inches and under	+ 8.00
19. Cast Steel, No. 1	+ 3.00
20. Uncut Tires	+ 2.00
21. Cut Tires	+ 5.00
22. Uncut Bolsters & Side Frames	Base
23. Cut Bolsters & Side Frames	+ 3.00
24. Angle & Splice Bars	+ 5.00
25. Solid Steel Axles	+12.00
26. Steel Wheels, No. 3 oversize	Base
27. Steel Wheels, No. 3	+ 5.00
28. Spring Steel	+ 5.00
29. Couplers & Knuckles	+ 5.00
30. Wrought Iron	+ 8.00

Restrictions on Use

(1) Price established for Grade 15 may be charged only when purchased and sold for rerolling uses; otherwise, ceiling price for such grade shall not exceed ceiling price established for Grade 14.

(2) Price established for Grade 30 may be charged only when sold to a producer of wrought iron; otherwise, ceiling price for such grade shall not exceed ceiling price established for No. 1 heavy melting steel.

CAST IRON SCRAP

Ceiling price per gross ton for any of the following grades of cast iron scrap shall be the price shown in the following table, f.o.b. shipping point.

1. Cast Iron, No. 1 (Cupola Cast)	$49.00
2. Cast Iron, No. 2 (Charging Box Cast)	47.00
3. Cast Iron, No. 3 (Heavy Breakable Cast)	45.00
4. Cast Iron, No. 4 (Burnt Cast)	41.00
5. Cast Iron Brake Shoes	41.00
6. Stove Plate	46.00
7. Clean Auto Cast	52.00
8. Unstripped Motor Blocks	43.00
9. Wheels, No. 1	47.00
10. Malleable	55.00
11. Drop Broken Machinery Cast	52.00

Restrictions on Use

(1) Ceiling shipping point or on-line price which a basic open-hearth consumer may pay for No. 1 cast iron, No. 1 wheels, clean auto cast or malleable shall be the ceiling price established for No. 3 cast iron.

(2) Ceiling shipping point or on-line price which any foundry consumer other than a malleable iron producer may pay for Grade 10 shall be the ceiling price established for No. 1 cast iron.

Preparation Charges

Ceiling fees per gross ton which may be charged for intransit preparation of any grade of steel scrap of dealer or industrial origin which is allocated by the National Production Authority to a consumer, shall be as follows:

(1) For preparing into Grades No. 1, No. 2 or No. 3, $8.

(2) For hydraulically compressing Grade No. 4, $6 per ton; Grade No. 5, $8.

(3) For crushing Grade No. 6, $3.

(4) For preparing into Grade No. 25, $6.

(5) For preparing into Grade No. 19, $6.

(6) For preparing into Grade No. 12, Grade No. 13, Grade No. 14, or Grade No. 18, $10.

(7) For preparing into Grade No. 17 or Grade No. 21, $10.

(8) For preparing into Grade No. 16 or Grade No. 20, $10.

(9) For hydraulically compressing Grade No. 15, $8.

(10) For preparing into Grade No. 28, $10.

Ceiling fees per gross ton which may be charged for intransit preparation of any grade of steel scrap of railroad origin shall be as follows:

(1) For preparing into Grade No. 1 and Grade No. 2, $8.

(2) For hydraulically compressing Grade No. 13, $6.

(3) For preparing into Grade No. 16, $4.

(4) For preparing into Grade No. 17, $5.

(5) For preparing into Grade No. 18, $7.

(6) For preparing into Grade No. 21, $4.

(7) For preparing into Grade No. 23, $4.

Ceiling fees per gross ton which may be charged for intransit preparation of cast iron shall be limited to the following:

(1) For preparing Grade No. 8 into grade No. 7, $9.

(2) For preparing Grade No. 3 into Grade No. 1, $4.

Whenever scrap has arrived at its point of delivery and the consumer engages a dealer to prepare such scrap, no fee may be charged for such services unless the consumer obtains prior written approval from OPS.

No preparation charge other than the charges set forth above may be made for the preparation of any grade of iron or steel scrap unless the consumer has secured prior written approval of such charges from OPS.

Commissions

No commissions shall be payable except by a consumer to a broker for brokerage services rendered. Where scrap is allocated by NPA other than from a government agency the seller may designate a broker. Where scrap is allocated by NPA from a governmental agency the consumer may designate a broker. In the event a broker purchases scrap for sale to a consumer such consumer may pay such broker a commission not exceeding $1 a ton.

Unprepared Scrap

The term "unprepared scrap" shall not include such demolition objects as bridges, box cars or automobiles which must be so priced that the prepared scrap will be delivered to the consumer within the established ceiling delivered prices.

For unprepared steel scrap other than materials suitable for hydraulic compression, the ceiling basing point prices shall be $8 per gross ton beneath the established ceiling price of the prepared base grades No. 1 heavy melting or No. 1 railroad heavy melting steel.

For unprepared material which when compressed constitutes No. 1 bundles the ceiling basing point price shall be $6 per gross ton beneath the ceiling basing point price for No. 1 bundles; or when compressed constitutes No. 2 bundles the ceiling basing point price shall be $8 per ton beneath the ceiling basing point price for No. 2 bundles.

Any iron casting which cannot be broken with an ordinary drop into Grade No. 2 or Grade No. 1 may not be classified as Grade No. 3. Where such iron casting requiring blasting or other special preparation is sold to a consumer of scrap, the shipping point price for Grade No. 3 must be reduced by the amount of the additional charges required for preparation.

Premiums for Alloy Content

No premium may be charged for alloy content except: $1.25 per ton for each 0.25% of nickel when scrap contains not less than 1% and not over 5.25% nickel; $2 per ton for scrap containing not less than 0.15 per cent molybdenum and $3 for scrap containing not less than 0.65% molybdenum; for scrap containing not less than 10% manganese, $4 for scrap in sizes larger than 12 x 24 x 8 in., and $14 for scrap cut in that size or smaller (applicable only if scrap is sold for electric furnace uses or on NPA allocation); $1 for scrap conforming to SAE 52100 when sold for electric furnace use only.

Switching Charges

Switching charges to be deducted from basing point prices of dealer industrial and nonoperating railroad scrap, to determine ceiling-shipping point prices for scrap originating in basing points are per gross ton:

Alabama City, Ala., 43c; Ashland, Ky., 47c; Atlanta, 51c.

Bethlehem, Pa., 52c; Birmingham, 50c; Brackenridge, Pa., 33c; Buffalo, 83c; Butler, Pa., 65c.

Canton, O., 51c; Chicago (including Gary, Ind.), $1.34; Cincinnati (including Newport, Ky.), 65c; Claymont, Del. (including Chester, Pa.), 79c; Cleveland, 76c.

Coatesville, Pa., 50c; Conshohocken, Pa., 20c.

Detroit, 95c; Duluth, Minn., 50c.

Harrisburg, Pa., 51c; Houston, Tex., 57c.

Johnstown, Pa., 75c.

Kansas City, Mo., 78c; Kokomo, Ind., 51c.

Los Angeles (including Firestone switching district), 66c.

Middletown, O., 26c; Midland, Pa., 75c; Minnequa, Colo., 33c; Monessen, Pa., 51c.

Phoenixville, Pa., 51c; Pittsburg, Calif., 65c; Pittsburgh (including Bessemer, Homestead, Duquesne, Munhall), 99c; Portland, Oreg., 52c; Portsmouth, O., 51c.

St. Louis (including Granite City, E. St. Louis, Madison, Ill.), 51c; San Francisco (including So. San Francisco, Niles, Oakland), 66c; Seattle, 59c; Sharon, Pa., 75c; Sparrows Point, Md., 20c; Steubenville, O., 51c.

Warren, Pa., 75c; Weirton, W. Va., 70c.

Youngstown, 75c.

Sheets, Strip . . .

Sheet and Strip Prices, Page 145 & 146

Cleveland—Mills are committed so heavily on DO tonnage there is little chance for any easing in the light, flat-rolled steel product supply situation for months to come. Even though some civilian goods production is scheduled to be cut back this means little so far as overall supply of sheets is concerned since the released tonnage will be quickly taken up on defense and related account.

Diversion of continuous mill rolling time to production of plates will be increasingly felt in the sheet market over coming months.

Most pressing problem before sheetmakers at the moment is how to adjust their supply position to care for the mandatory warehouse load imposed on them through amended NPA order M-6. This specifies that the mills provide the warehouses with 85 per cent of the latter's tonnage receipts in the base period, first nine months of last year. To comply with this order the producers will have to further cut back their shipments on unrated accounts.

Boston—Silicon and stainless allocations for June to nonrated users are sharply reduced, 50 per cent in case of electrical sheets and strip and even more on stainless. Practically all straight stainless flat-rolled production will shortly carry ratings with straight chromium grades tightening as substitutions increase. All mills have not scheduled for June these two specialties, but this pattern will hold. What is ahead for non-rated consumers of carbon sheets is indicated by 50 per cent reduction in May allocation to one large consumer, still engaged around 90 per cent on civilian production. Cold strip converters have more DO orders, additional cartridge clip steel, and in some cases what they are getting in the way of rated tonnage is in excess of basic quotas.

New York—Promises on DO-rated orders for stainless sheets and silicon sheets run well into August, for the major grades, hot and cold rolled sheets, notably, July at earliest. Meanwhile, the movement of sheet tonnage into commercial channels is definitely on the decline and with cutbacks in prospect on automobiles and durable consumer goods generally, this trend will undoubtedly continue over the next several months.

Philadelphia—Non-rated consumers of sheets are buying premium-priced tonnage on an increasing scale, turning more to imported steel. Some are now buying as much as 1000 tons per month, or more, from abroad at prices ranging 9 to 12 cents f.o.b. port. High premiums also are being paid for plates and shapes from the other side. Within another two weeks mills will be allocating tonnage for civilian requirements for June on an ever decreasing scale. As for DO-rated work, producers having nothing before July and August on the major grades. Producers of cold rolled alloy strip have been given a minimum quota of 5 per cent for DO-rated work.

Pittsburgh—Non-rated consumers of light-rolled products in June will feel the effects on supplies of amended NPA M-6 providing the warehouses with 85 per cent of their tonnage receipts in the first nine months of last year. Any increase in deliveries to the distributors must necessarily be at the expense of nonrated mill tonnage, and while some civilian goods lines are cutting production the cutbacks are not sufficiently large to assure any substantial additional tonnage for the open market.

Resumption of operations at Jones & Laughlin's Pittsburgh works following 2-weeks shutdown due to railroad labor trouble will contribute materially to improvinng conditions. This shutdown caused loss of an estimated 2000 tons of sheets daily and is necessitating some schedule rearrangements to meet DO commitments.

Cincinnati—Supplies of sheets are extremely tight. District sheet mills are working on June schedules, unable now to indicate how they will compare with May.

Chicago—Greatly diminished fear buying of consumer goods is resulting in large volumes of these products pilling up in plants and warehouses of manufacturers, causing market experts to believe production may be scaled down in the near future somewhat below the limitations imposed by NPA. These products, notably electrical appliances, radios, television sets and even automobiles, all are heavy consumers of sheets and strip thus easing in demand for these steel items could occur. In many cases manufacturers of this type of goods lack DO orders or are not ready to make rated items.

In the meantime, pressure for flat-rolled steel is extremely heavy. Frst month in which mills can book additional DO orders under minimum set-aside has moved ahead for several products, namely enameling iron sheets from June to July, electrical sheets from July to August, and hot-rolled strip from November to December.

St. Louis—Cold-rolled sheet demand mounts. Shipments from this district have been gaining for months. But buyers' fears are spurred by the numerous Washington directives. Sheetmakers here can see their way clear to make promised deliveries no farther than June.

Birmingham—Some cutbacks in sheet tonnage for nonrated consumers is expected soon.

Tubular Goods . . .

Tubular Goods Prices, Page 148

Cleveland—Pipemakers are booked many months ahead on line pipe, some mills not promising delivery until next year. Word from Washington is that defense production authorities fear the shortage of pipe may force cutbacks next winter in deliveries of natural gas to many industrial areas. It is said a large amount of pipe previously scheduled for delivery this year will not be shipped in time to meet scheduled completion dates for a number of important oil transportation, gas transmission and gas distribution projects.

Seattle—Army and other government installations are calling for substantial tonnages of water pipe. However, cast iron producers cannot meet delivery specifications and some business has been diverted to concrete and other types.

Backers of a proposed natural gas pipe line from Alberta, Canada, to the North Pacific Coast, state the project awaits allocation of 190,000 tons of plates required. A decision is expected by May 1.

Steel Bars . . .

Bar Prices, Page 145

Boston—With an increasing number of bar consuming plants rated bookings are heavier. As their volume increases, less steel is available for civilian production, notably alloys. Leaner alloys are being substituted increasingly where possible, but for defense contracts alloy specifications are for the most part retained. Armament volume has mounted with bar fabricators until this steel product tops most others for defense with forgings, government shops, bolts and nuts, shell components and screw machine products leading demand. Flats are especially tight in all grades, making nuts more of a production problem than bolts. Washers are also in this category.

New York—Promises of carbon bar producers on DO-rated orders vary, depending upon the mill and specifications. However, very little tonnage, if any, is available before June. On cold drawn carbon bars delivery promises appear to fall generally in August. Promises on alloys, both hot and cold, for DO-rated requirements are mainly for August and beyond. As for non-rated requirements, the mills will not open their books for June until the middle of this month, or 45 days before the month in which the material is to be shipped.

Philadelphia—Barmakers anticipate progressive tightening in supply conditions as military demands mount. Little effect has been felt in the markets so far, however, by the entrance of the fastener industry into the railroad program and the requirements for locomotives are not expected to become particularly pressing until third quarter. DO tonnage bookings of many producers extend well into third quarter on the basis of 25 per cent set-aside for both hot-rolled and cold-finished carbon bars. Alloy bars are hard to get with producers booked into third quarter.

Philadelphia—Some cold drawers are quoting August shipment on carbon grades for DO-rated work and anywhere from October to December on alloy grades. Philadelphia delivered prices on hot carbon bars from Johnstown, Pa., the governing base for this district, will be 4.20c per pound, effective Apr. 4, against the current price of 4.18c. This will reflect a 4 per cent increase in the rail freight rate on 40,000-pound carlots.

Cleveland—Bar deliveries are becoming increasingly extended under rising pressure of defense requirements. DO bookings extend well into third quarter and indications are June allotments on regular commercial account will be cut again. Whether the warehouses will receive larger tonnage as result of amended NPA M-6 is uncertain.

Chicago—Demand for hot-rolled

and cold-finished carbon bars for civilian account continues far beyond producers' ability to accommodate. Even tonnage for rated account becomes more extended in deliveries. First month in which new DO orders for hot-rolled bars can be accepted under the minimum NPA set-aside is the September-October rolling cycle.

Seattle — Rolling mill operations continue at peak, although Northwest Steel Rolling Mills Inc., Seattle, is handicapped by an ingot shortage. Backlogs are better than normal and will carry mills into the third quarter.

Plates . . .

Plate Prices, Page 145

Chicago — Despite the fact local plate producers have normally been turning out fair tonnages of lighter thicknesses on continuous strip mills, total plate production is inadequate to meet demand in a manner satisfactory to consumers. DO and other rated needs are being accommodated but still not without extended deliveries. A week ago July was the first month in which there were openings for further DO orders under the minimum set-aside. This has now moved to August. Floor plates have moved from June to July.

Boston—Weldment shops are operating heavier than average fabricating plants on rated orders, 55 to 60 per cent in some cases. For this class of work, plate tonnage is sufficient to maintain schedules, but so-called free tonnage allocations are down with inventories low. Backlogs include more orders for machine bases. Shops with low volume of defense orders, already pinched for light gage plates, are in for a tighter squeeze in second quarter with May allocations cut 30 to 40 per cent. For meeting rated requirements, incoming volume is improving with the reverse true for civilian needs.

Holyoke, Mass., electric weld pipe shop has booked water main tonnage taking approximately 5350 tons, delivery Queens, N. Y.

New York—Despite recent measures to relieve the pressure on plates for defense work, namely, the stepping up in strip plate production and in DO quotas, plate producers generally have little tonnage left for June for rated requirements and some are booked well into August on sheared plate.

Philadelphia—Although some plate tonnage is still available in June for DO-rated work, most mills have nothing to offer before July and some nothing before August. The railroad freight rate on plates in 40,000-pound lots to this city will be stepped up Apr 4, 1 cent per 100 pounds from Sparrows Point, the governing base for this district because of its lower mill price. The delivered price will be 4 cents per pound.

Pittsburgh—Some plate producers are booked for third quarter on DO account. Pressure for tonnage continues to mount. Makers anticipate increased demand from the warehouses as result of amended NPA order M-6 aimed to provide the distributors with 85 per cent of their tonnage receipts in the base period, first nine months of 1950.

Diversion of additional continuous mill time to production of plates is not thought likely to add to unrated tonnage supplies since expanding defense needs will more than take up the added production. Some producers suspect duplication of certain orders in the railroad car program, checks in several instances developing tonnages that do not legitimately come under the program. Meanwhile, National Production Authority has ruled that producers do not have to honor orders for maintenance, repair and operating needs under the railroad program since these are covered by order DO-97.

Birmingham—Plates, already extremely tight, face an even more stringent supply situation. Additional allocations will be made for car building.

Seattle — Plates are increasingly scarce and small fabricators will not bid unless they have inventories or firm orders for materials placed.

Wire . . .

Wire Prices, Page 147

Boston—So heavily are wire mills booked on high carbon specialties, five to six months in some cases, new commitments are made cautiously with screening of inquiries tightening.

Birmingham—DO orders in wire have increased measurably over the last several weeks, contributing to the tightness in supplies.

Structural Shapes . . .

Structural Shape Prices, Page 145

New York—Restrictions on use of steel and other building materials constitute a real threat to building operations in the metropolitan area, leaders in the building industry declare. The New York Building Congress advises Washington that because of contradictions in federal controls many builders are withdrawing from the planning stage millions of dollars of needed building, still permissible under regulation M-4, which will be reflected in a sharp falling off in work late in the year.

Structural bookings in February amounted to 200,788 tons, against a revised figure of 286,178 tons in January, says the American Institute of Steel Construction. Shipments amounted to 154,783 tons, against a revised figure of 176,862 tons in the preceding month.

Shop backlogs for the four months beginning with March amount to 830,225 tons and beyond that period another 1,398,240 tons, or a potential volume of work ahead of 2,228,495 tons, against 2,136,865 tons as of Jan. 31.

Boston—From stock and fill-in plain material, district fabricating shops are able to make four to five months delivery on small lots, 300 tons and under, but at high prices to cover premiums paid for shapes. Large tonnage contracts depending on normal mill rollings range from 12 to 15 months with four to five months earlier on rated work. Some volume booked earlier is being switched to rated status where circumstances permit.

Philadelphia — Despite a heavy amount of construction under contemplation, particularly industrial work, awards are light. Fabricating shops have backlogs running well into next year in most cases. Minimum mill quotas on shapes for DO-rated work have been increased 10 points, from 20 to 30 per cent, and on piling 15 points, from 15 to 30 per cent. Effective Apr. 4, minimum delivered Philadelphia price on shapes by rail in 40,000-pound carlots from Bethlehem, Pa., the governing mill base, will be 3.91c, reflecting an increase of 1 cent in the freight rate, to 21 cents per 100 pounds.

Pittsburgh—While bans on certain types of construction have not contributed noticeably to easing in the structural market, fabricators are booking non-rated tonnage cautiously since deliveries on the latter range up to a year with most shape producers. Consequently, greatest effort is expended on securing work carrying DO ratings. Producers are aiding small contractors in obtaining subcontracts by advising them of defense orders placed with the larger companies. Contracts for some jobs involving large volume are spread over the remaining months of this year and into 1952. Among recent large bookings are 6000 tons for the new generator building of Westinghouse Electric Corp. at East Pittsburgh, Pa. This tonnage will be furnished by Bethlehem Steel Co.

Seattle — Some fabricators find it useless to bid on new projects except where DO priorities can be obtained. Otherwise, it is impossible to obtain steel.

Reinforcing Bars . . .

Reinforcing Bar Prices, Page 145

Boston—Concrete bar distributors are barely meeting commitments with allocations nearly 25 per cent below last year. Relatively little tonnage is in sight to meet heavier demand for bridges, housing and hospitals, in excess of 5000 tons. Deliveries on ex-quota tonnage under rated orders extend to September with fabricators, mills being booked into August on DO's.

Los Angeles—With 95 per cent of building projects unrated and building costs up 60 per cent since the start of the Korean war, pressure is rising to cut state of California's planned $168 million building program.

Tin Plate . . .

Tin Plate Prices, Page 146

Pittsburgh—DO-rated tin plate orders extend into July against the present 5 per cent set-aside established under National Production Authority regulations. Producers are turning away new accounts in the present tight supply situation but they have not yet been forced to cut allocations to established customers. Easing of government limitations on use of cans for certain products now permits packing products with a DO-rating in whatever types of metal containers are specified by the armed services. This easing of restrictions on tin use is incorporated in an amendment to NPA order M-25 dated Mar. 16.

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Coal Chemicals . . .

Coal Chemical Prices, Page 148

Pittsburgh—United States Steel Co. has moved the headquarters of its Coal Chemical Sales Division from New York to Pittsburgh. Offices on the tenth floor of the new US Steel-Mellon building were occupied last week. C. W. Baldwin is director of the division.

Pig Iron . . .

Pig Iron Prices, Page 144

New York—Pig iron imports are being sustained in fair volume, despite shortage of ships, but the outlook for second half is for an appreciable decline. Most leading European sellers are booking tonnage sparingly for shipment here as defense requirements on the other side tighten. However, there undoubtedly will be some iron available as western European nations are badly in need of fuel, which this country has in good supply. There has already been some exchange of coal for pig iron and it appears that there will be more of this bartering as time goes on. Actually some believe that much of the pig iron brought in from the other side in the latter part of the year will be on an exchange basis.

Buffalo—It became more apparent last week that producers of national defense orders were going to encounter increasing difficulty finding ample castings unless a more rigid allocations program is adopted. Rumors that a leading automotive manufacturer was planning to build a gray iron foundry here were denied, although a representative of the firm said the rumors may have started over how the firm might hope to obtain castings in the present market.

Philadelphia—While some of the larger consumers of pig iron are not too concerned over supply for the moment, they are concerned about receipts in the second half. Buyers are no longer able to step up purchases of imported iron for the current half. Some Austrian iron is being offered for second half. Also some Turkish iron is reported offered.

An advance of 4 per cent in rail rates Apr. 4 will increase minimum delivered prices here on basic to $56.49, No. 2 foundry, $56.99, malleable, $57.49 and bessemer $57.99. These delivered prices are based on Bethlehem, Pa. On low phosphorous iron from Steelton, Pa., the rate will increase 12 cents and will bring the Philadelphia delivered price up to $63.12.

Pittsburgh—Merchant iron sellers are turning away requests for additional tonnage over and above current allotments. The foundries, as a result, are having a tough time obtaining sufficient iron to build inventories to levels they consider desirable. However, no serious curtailment of foundry operations is noted with most shops on a 5-day week, some on 6-days. They are using more scrap and ferroalloys in melts, but the shortages of these latter raw materials are just about as severe as that in pig iron. Blast furnaces are holding shipments to established levels and there is little expectation of any increase in iron tonnage in the near future.

Basic iron is as tight as foundry grade and with progressive shortening in scrap supply theatened the steelmakers see need for additional pig iron capacity if expanded steelmaking facilities are to mean anything in the future. E. T. Weir, chairman, National Steel Corp., last week said the steel industry must prepare now to use a much higher percentage of pig iron in the production of steel; that it would be foolish to plan for new steel capacity on any other basis.

Cleveland—Merchant iron sellers are distributing tonnage in such fashion no serious interruptions in foundry operations are necessitated in this district for lack of iron. Scrap supply problem appears more difficult for foundrymen at present than either pig iron or coke. Iron producers see no immediate need for government allocations. Eight out of 9 blast furnaces in the immediate Cleveland district are in blast, one Jones & Laughlin stack still being down for repairs. It is expected to be blown in shortly, however. The Toledo stack of Interlake Iron Corp. has been restored to blast after being down for a number of weeks for repairs.

Cincinnati—Shipments of pig iron into this district are holding fairly steady. Melters without established sources of supply are meeting the situation, in many cases, by use of foreign iron despite premium price. More foreign iron is coming into the district than ever before. Foundry stocks of scrap are low, some near exhaustion.

Chicago—Insufficient pig iron and an irregular delivery situation combine to reduce foundry operations. Other shortages in raw materials, namely, coke, scrap and alloys, contribute to the unhappy picture also. Inventories are low and production schedlues are sensitive to such unbalances as occur. Jobbing shops frequently have an opportunity to catch up a bit as shipments arrive, but captive foundries operating close to 100 per cent of capacity lose ground. Tonnages of foreign iron available in this market from time to time are taken up readily but percentage-wise the volume is small. Of the district's 42 blast furnaces, 40 are active. Youngstown Sheet & Tube Co. blew out its No. 5 stack at South Chicago Mar. 26 for relining.

St. Louis—Pig iron producers are operating at capacity and holding shipments on schedule. Most foundries, are working 5 days but are pressing for iron to go to 6 days.

Birmingham—Pig iron supply, while far from adequate, is being distributed on a basis of most urgent needs.

Manganese Ore . . .

Washington—Increased supply of manganese may be made available through accelerated commercial production of the ore in Greece.

To promote exploration for manganese on the island of Samos and in the Grantitis district of the Greek mainland, Economic Co-operation Administration is advancing the equivalent of $119,000 to two Greek mining firms: Partnership of Spiros Typaldos, and the firm of Dimitri Scalistriri.

Warehouse . . .

Warehouse Prices, Page 149

Boston—Whether or not more steel will be available warehouses under amended order M-6 may be a matter of conjecture, but regardless, supply will continue substantially under demand. Probably lower tonnage is the outlook for distributors who have been holding out for DO's on which to base replacements. First steel under new quota regulation is expected to reach warehouses in June, some tonnage being included in May schedules by one leading supplier. Possible demise of DO-97, which promises to foul up scheduling further, brought out some inquiries on which consumers wrote their own ticket. Base quotas on alloy products are low but deliveries fail even to reach theoretical level.

Philadelphia—Little if any net gain in business on a daily basis was recorded in the local warehouse market in March.

Pittsburgh—Steel distributors in this district are not too optimistic with respect to larger future mill shipments. Despite amended NPA M-6 which is designed to provide the warehouses with 85 per cent of their tonnage receipts from the mills in the first 9 months of 1950, there is little chance deliveries will be increased before June though the order became effective Mar. 15. The reason for this, mill schedules already have been set up for May. The warehouses have been receiving only 40 to 50 per cent of certain popular product tonnages due them under the initial warehouse supply regulation and there is considerable doubt the amended order stipulating 85 per cent of base tonnage shipments will materially alter their inventory position.

Cleveland—Distributors are hoping amended NPA M-6 will improve their inventory position but they are making no predictions pending developments. Effect of the order will not be apparent before June. Meanwhile, demand pressure on the warehouses, if anything, is stronger than ever and their stocks are gradually shrinking.

Cincinnati—The outlook for steel warehouses is brighter because of amended order M-6, but the supply situation is certain to continue critical until larger mill shipments are started. Warehouse attempts to spread available steel so far as possible tends to smaller individual shipments.

Chicago—Small manufacturers are more vociferous in complaints of inability to obtain their requirements from legitimate sources. Offerings in the gray market are substantial despite the effort of steelmakers to track down the origin of the material. One consumer of small amounts of precision cold-rolled strip reports it is obtaining only 40 per cent of its needs from established warehouses and is purchasing 60 per cent in the premium market.

Los Angeles—Reaction by warehousemen to amended M-6 is mixed. Now at tooling-up stage with full-production scheduled to start in May.

...ct fabricators expect less and ... steel from distributors—without ...

...eattle — Wholesalers report de... is still in excess of supplies ... some items practically unob... able. Mill deliveries are behind ... ible. Inventories are extremely ...

Scrap . . .

Scrap Prices, Page 152

Pittsburgh—Upgrading of scrap has become serious in this area. Many purchasers are rejecting shipments because of improper classification. This problem is limited to a great extent to shipment from outside this area—local purchases are usually correctly graded.

Allocations have not been necessary in this area so far. Although inventories are low there is enough scrap to support operations at the present high level. It is expected, however, increasing production capacity will in the not distant future, reduce scrap supply to the extent operations will be impaired, unless allocations are put into effect.

Boston—Steel scrap allocations are limited to direct assignment of unprepared material from government shops or arsenals and some railroad tonnage through brokers. Bids on scrap from Watertown arsenal were returned. No. 1 heavy melting consumer inventories are small and supply is short. Usual $2 spread between heavy melting grades tends to retard yard separation. Ceiling premiums are paid for some steel grades, including structural and plate scrap. Cast is less active, due in part to inventory levels and upgrading. Sale of unstripped motor blocks at $43 brings that grade up to ceiling from $40, previously paid.

Buffalo—The shrinkage in fresh scrap supplies is rapidly reaching an alarming stage here. Flow of material into dealers' yards remains at one of the lowest points for years. Concern is also expressed over the sharp decrease in movement of scrap from mid and down-state sections which usually ship to local sources. Dealers deny any knowledge of transactions in this area that are not in accordance with government regulations.

Philadelphia—While scrap remains tight, the outlook appears to be just a shade brighter. No furnaces are having to be taken off because of shortage, and some trade leaders believe if the line can be held for another two or three weeks, consumers may get over the hump and be able to carry on for some time without too much difficulty. Producers of industrial scrap appear a little less hesitant about releasing scrap. Increase of 4 per cent in rail freight rates Apr. 4 will be at the expense of consumers.

Detroit—Office of Price Stabilization authorized an increase of $1.15 a gross ton at Detroit on iron and steel scrap, correcting an inequity in its No. 5 price regulation. Detroit ceiling price for No. 1 heavy melting steel scrap is now $41.15 for dealer and industrial grades and $43.15 for railroad grade.

Because of the two prices which were possible under the original regulation, dealers had hesitated to sell scrap for fear of opening themselves to prosecution. OPS takes the view that rebates should be made on all sales made at the $40.20 shipping point price prior to the change, which went into effect Mar. 27, and is not retroactive.

New York—Upgrading in scrap is expected to bring some adjustments in price schedules soon. Such action has been under consideration for some time. There has been a slight improvement in the flow of scrap recently but consumers' inventories are dangerously low.

Chicago—Consumers continue disturbed over NPA emergency allocations of melting material from this area to eastern and other centers. Despite the fact supply may be somewhat more plentiful in the district and no actual hardship is resulting currently fear exists the overall shortage in the country will eventually make it impossible to recoup present loss of material by allocations in this direction when critical need develops. Brokers and dealers are not too concerned over OPS plans to spot check shipments enroute to mills to detect upgrading.

Cleveland—Shortage of scrap is becoming more severe and in some instances has reached the critical stage. This is particularly true in the case of foundries; some are dependent upon receipt of daily shipments to maintain operations. Allocation of material involves a larger number of users and a steadily increasing tonnage. Part of the scarcity of scrap is attributed to the fact that a smaller portion of steel entering production of defense goods emerges as scrap than under normal civilian operations. In addition, large tonnages of iron and steel are going into products which are exported out of this country and, hence, are lost as potential sources of scrap.

Cincinnati—The shortage of scrap iron and steel, both open hearth and foundry grades, is becoming more severe. Some interests are on a day-to-day supply basis, with operations threatened to the extent allocations may be required. Material is not coming out as freely as heretofore but brokers are reaching out farther for needs, melters willing to pay long-haul freight.

St. Louis—Supply of "free" scrap shrinks as dealer allocations increase, although shipments are improving with moderation of the weather. Ground stocks of all consumers are depleted, but the smaller foundries without allocations are the principal sufferers.

Birmingham—Scrap is moving in big volume. Some users, especially those of cast grades, are going far afield for supplies.

Los Angeles—With mills anxious to buy, competition among dealers for limited supplies of available scrap is at high pitch. Fabricators are in process of converting to full-scale defense production and generation of shop scrap is at low ebb.

San Francisco—A shipload of scrap from the Philippines relieved at least temporarily a raw material worry for one big steel producer here. The Philippine scrap price runs as high as or higher than the domestic ceiling price after consideration is given to the charter and freight charges.

Seattle—Scrap buyers are willing to pay top prices in an increasingly tight market. Receipts are barely sufficient to cover consumption, but under current conditions it is impossible to add to inventory. Severe weather in eastern Washington slowed shipments and collection. One full cargo of 9000 to 10,000 tons of scrap is coming from the Philippines for discharge at Bethlehem's local plant.

Metallurgical Coke . . .

Metallurgical Coke Prices, Page 148

Pittsburgh—No action has been taken by coke producers in this area either oven or beehive interests, to advance prices despite permission of government stabilization authorities to raise quotations to the extent of raw material cost increases since January.

Furnace coke appears to be in somewhat easier supply position than was the case recently. This is attributed to slower demand accompanying the taking off of several blast furnaces for repairs outside this immediate district.

General Brehon Somervell, chairman and president, Koppers Co. Inc., announced last week that contracts to build 217 by-product coke ovens have been received since the first of the year. The company had 770 ovens under contract for completion in 1951 at the close of 1950.

Cleveland—Coke supplies are tight but adequate to support foundry operations at the current production level. Producers are spreading out tonnage to their customers so that no curtailment of production has been necessitated. However, buyers are unable to build inventories, some of them being on what they describe as a hand-to-mouth supply basis. Some Connellsville beehive coke has been coming into this district but the tonnage has not been particularly heavy. Coke producers have made no move toward raising prices since permission was granted them a couple weeks ago to adjust their quotations upward to the extent of raw material cost increases since January. The subject is under study.

Chicago—Foundry coke supply is uncomfortably tight in this area despite the fact oven coke available locally is augmented by shipments of beehive from the East. Furthermore, shipments of fuel arrive at foundries on somewhat irregular schedules and holdups occur to disrupt melting operations.

Canada . . .

Toronto, Ont.—Production of primary iron and steel shapes in Canada during 1950 totaled 4,265,022 net tons and included 4,117,163 tons of carbon and 137,859 tons of alloy steel. For 1949 production was 3,666,242 net tons, including 3,556,507 tons of carbon and 109,735 tons of alloy.

Shipments for sale during 1950 totaled 2,832,872 net tons compared

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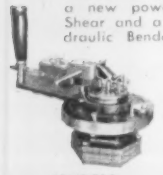
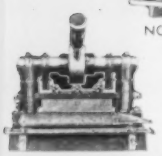


BENDERS

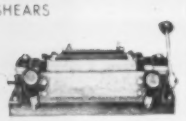
PUNCHES

ROD PARTERS

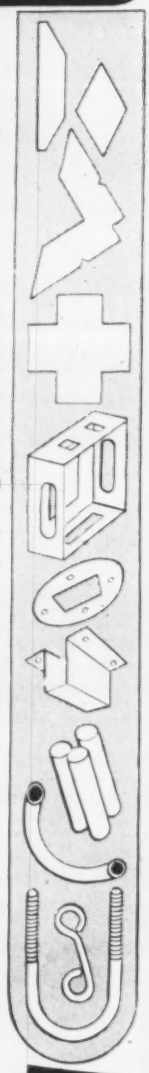
NOTCHERS



SHEARS



BRAKES



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with 1949 shipments of 2,708,191 net tons.

For December, 1950, production amounted to 346,077 net tons against 390,988 tons in November and 305,636 tons in December, 1949. Shipments for sale in December amounted to 250,255 net tons against November shipments of 255,642 tons.

STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

3000 tons, plant addition, United Aircraft Corp., East Haven, Conn., to Harris Structural Steel Co., New York.

3000 tons, boiler house, United Aircraft Corp., Windsor Locks, Conn., to Harris Structural Steel Co., New York.

1200 tons, plant addition, United Aircraft Corp., East Hartford, Conn., to Harris Structural Steel Co., New York.

1000 tons, municipal bridge, Harlem river at Willis Avenue, New York, to Lehigh Structural Steel Co., Allentown, Pa.

1000 tons, plant, General Refractories Co., Warren, O., to American Bridge Co., Pittsburgh.

700 tons, addition to Crown-Zellerbach Corp. paper mill, West Linn, Oreg., to Pacific Car & Foundry Co., Seattle.

115 tons, shipping building and office, United Aircraft Corp., Bridgeport, Conn., to Fort Pitt Bridge Works, Pittsburgh.

375 tons, ordnance repair shop, Fort Richardson, Alaska, to Maxwell Steel Co., Fort Worth, Tex.; general contract to Valle-Sommers Construction Co., Seattle.

250 tons, high school building, West Bridgewater, Mass., to Builders Iron Works, Somerville, Mass.; Rich Bros. Construction Co., Inc., Boston, general contractor.

STRUCTURAL STEEL PENDING

2200 tons, factory and office building, Arma Corp., Hempstead, Long Island, N. Y.; bids Apr. 2.

2000 tons, nurses' school and residence, Bellevue Hospital, New York; bids postponed to Apr. 11, by Department of Public Works.

600 tons, Public School No. 112, Queens, New York; bids Apr. 3.

550 tons, hospital, Norwalk, Conn.; bids asked.

521 tons, contract 12, Van Wyck expressway, Queens, N. Y.; bids Apr. 10.

333 tons, state bridge, Lehigh county, Pennsylvania; bids Apr. 20.

325 tons, mine assembly plant, Navy, Earle, N. J.; bids asked.

250 tons, McKinley School, Fairfield, Conn.; pending.

130 tons, police facilities, Delaware River Bridge Commission, Camden, N. J.; Golden Construction Co., Philadelphia, low.

110 tons (also 15 tons reinforcing), bridge in Siskiyou National Forest; bids to Bureau of Public Roads, Portland, Oreg., Apr. 3.

100 tons, Pennsylvania railroad bridge, Logansport, Ind.; bids Apr. 3.

Unstated, vehicle warm storage building, Elmendorf air force field, Alaska; bids to U. S. Engineer, Anchorage, Apr. 12.

Unstated, two spans, Chena river and Noyes Slough, near Fairbanks, Alaska; bids to Alaska Road Commission, Juneau, Apr. 16.

Unstated, (also reinforcing bars), Chulitna river bridge, Alaska; bids to Alaska Railroad, Anchorage, Apr. 11.

Unstated, $20 East Harlem General Hospital, New York; bids May 20.

REINFORCING BARS . . .

REINFORCING BARS PLACED

350 tons, high school building, West Bridgewater, Mass., to Northern Steel Inc., Boston; Rich Bros. Construction Co. Inc., Boston, general contractor.

250 tons, housing project, Cambridge, Mass., to Truscon Steel Co., Boston; A. F. Spinelli Construction Co., Boston, general contractor.

100 tons, ordnance repair shop, Fort Richardson, Alaska, to Mercer Steel Co., Portland, Oreg.; general contract to Valle-Sommers Construction Co., Seattle.

REINFORCING BARS PENDING

6000 tons, two schedules 16.9-mile extension East low canal, Columbia Basin project; J. A. Terteling & Sons, Boise, Idaho, low

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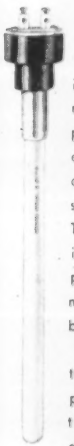

A background of many years of experience and "know-how" go into the production of Gordon Platinum, Platinum-Rhodium Thermocouples. From this experience has evolved the Gordon policy which calls for the utmost in quality and service, the utmost in value to clients. That is why Gordon platinum wire is carefully checked for thermocouple accuracy against a master thermocouple...calibrated and certified by the National Bureau of Standards.

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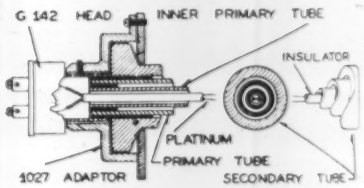

into a complete thermocouple assembly is light in weight and permits easy replacement of new elements into a protecting tube assembly.

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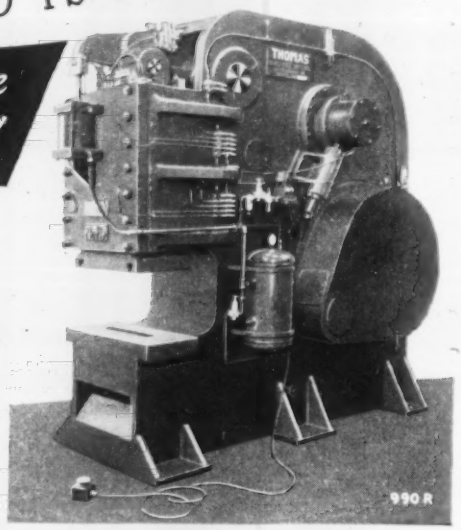

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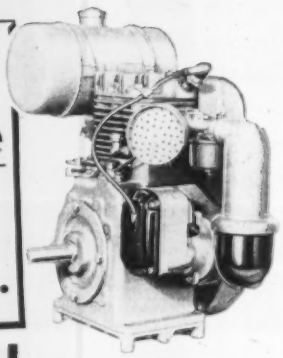

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4-Cycle Single Cylinder Engines

	Model ABN	Model AKN
Bore	2½"	2⅞"
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Piston Displ. (Cu. In.)	13.5	17.8
HORSEPOWER		
1800 R.P.M.	2.5	3.6
2200 R.P.M.	3.1	4.5
2600 R.P.M.	3.7	5.3
3000 R.P.M.	4.2	5.9
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$2,888,491 and $601,812 respectively.

200 tons (also 70 tons shapes), Wash., state Portage canal bridge; bids to O. . . Apr. 10.

133 tons, state bridge, Lehigh county, Pennsylvania; bids Apr. 20.

Unstated, material for expansion of Rock Island power plant, Columbia river, Washington; bids to Stone & Webster Corp., Boston, Apr. 6.

Unstated, two Montana highway bridges, Gallatin county and Pondera county; bids to Helena, Mar. 29.

Unstated, addition to Mines building, University of Alaska, College, Alaska; Lydig Construction Co., Vancouver, Wash., low general $424,726.

RAILS, CARS . . .

LOCOMOTIVES PLACED

Texas & Pacific, 52 diesel-electric locomotives, to Electro-Motive Division, General Motors Corp., LaGrange, Ill.; included are seven 3-unit, 4500-hp, four 2-unit 3000-hp and one 1500-hp freight locomotives; three 2-unit 4500-hp and two 2250-hp passenger locomotives; six 1500-hp road-switching locomotives; and eight 1200-hp switching locomotives.

RAILROAD CARS PLACED

Atchison Topeka & Santa Fe, 250 seventy-ton ballast cars, to American Car & Foundry Co., New York.

Baltimore & Ohio, 2500 freight cars; bids Apr. 11. List comprises 1000 forty-ton box cars, 1000 seventy-ton gondolas, 500 seventy-ton covered hoppers.

Bangor & Aroostook, 500 forty-ton refrigerator cars, to Pacific Car & Foundry Co., Renton, Wash.

Central Railroad of New Jersey, 500 fifty-ton box cars, to American Car & Foundry Co., New York.

Chicago & Eastern Illinois, 500 seventy-ton and 500 fifty-ton hopper cars to Pressed Steel Car Co., Chicago.

Delaware, Lackawanna & Western, 500 fifty-ton hopper cars, to American Car & Foundry Co., New York.

Grand Trunk Western, 1050 cars: 250 box cars and 300 gondolas, to General American Transportation Co., Chicago; 250 box cars and 250 hopper cars, to American Car & Foundry Co., New York.

Great Northern, 1000 seventy-ton ore cars, to American Car & Foundry Co., New York.

Missouri Pacific, 100 fifty-ton pulp wood cars, to its own DeSoto, Mo., shops.

New York Central, 1000 fifty-five ton hoppers; bids closed Mar. 29.

Pennsylvania, 64 stainless steel passenger cars, to Budd Co., Philadelphia.

Southern Pacific, 500 seventy-ton ballast cars to American Car & Foundry Co., New York; 100 seventy-ton gondola cars to the Greenville Steel Car Co., Greenville, Pa.

FERROALLOYS

(Continued from page 149)

4-6%, C 4-6%). Add 1.1c to high-carbon ferrochrome prices.

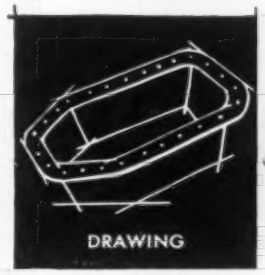
Low-Carbon Ferrochrome: (Cr 67-72%.) Contract, carload, lump, bulk, max. 0.03% C 33.60c per lb of contained Cr, 0.04% C 31.50c, 0.06% C 30.50c, 0.10% C 30.00c, 0.15% C 29.75c, 0.20% C 29.50c, 0.50% C 29.25c, 1% C 29.00c, 1.50% C 28.85c, 2% C 28.75c. Carload packed add 1.1c, ton lot add 2.2c, less ton add 3.9c. Delivered, Spot, add 0.25c.

Low-Carbon Ferrochrome, Nitrogen Bearing: Add 5c to 0.10% C low-carbon ferrochrome prices for approx 0.75% N.; add 5c for each 0.25% of N above 0.75%.

Foundry Ferrochrome, High Carbon: (Cr 62-66%, C 5-7%.) Contract, c.l. S M x D, bulk, 23.25c per lb of contained Cr, C.l., packed 24.15c, ton 25.50c, less ton 27.25c. Delivered Spot, add 0.25c.

Foundry Ferrochrome, Low Carbon: (Cr 50-54%, Si 28-32%, C 1.25% max.) Contract, carload, packed, S MxD, 16.35c per lb of alloy; ton lot 17.2c; less ton lot, 18.4c, delivered; spot, add 0.25c.

Low-Carbon Ferrochrome Silicon: (Cr 34-41%, Si 42-49%, C 0.05% max.) Contract, carload, lump, 4" x down and 2" x down, bulk, 21.75c per lb of contained chromium plus 12.4c per pound of contained silicon; 1" x down, bulk 21.90c per pound of contained chromium plus



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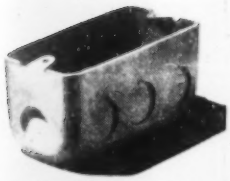

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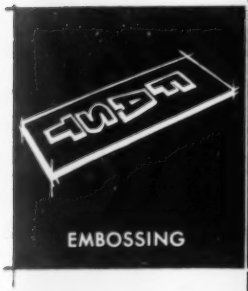
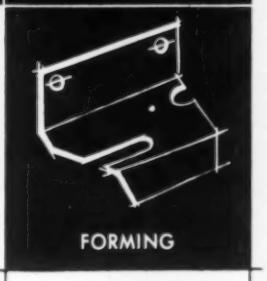


FEEDING PAN



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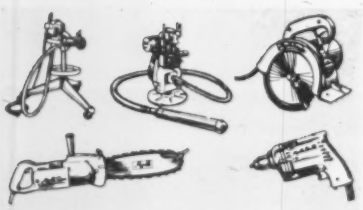

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Ferrochrome Silicon, No. 2: (Cr 36-39%, Si 36-39%, Al 7-9%, C 0.05% max.) 21.75c per lb of contained silicon plus 12.4c per lb of contained silicon plus aluminum, 2" x down, delivered.

Chromium Metal: (Min. 97% Cr and 1% Fe) Contract carload, 1" x D; packed; max. 0.50% C grade, $1.08 per lb of contained chromium; ton lot $1.10, less ton $1.12. Delivered. Spot add 5c.

Tungsten Alloys

Ferrotungsten: (70-80%). Contract, 10,000 lb W or more, $3.25 per lb of contained W; 2000 lb W to 10,000 lb W, $3.25; less than 2000 lb W, $3.47. Spot, add 2c.

Tungsten Powder: (W 98.8% min.) Contract or spot, 1000 lb or more, $4.15 per lb of contained W; less than 1000 lb W, $4.25.

Silicon Alloys

25-30% Ferrosilicon: Contract, carload, lump, bulk, 20.00c per lb of contained Si; packed 21.40c; ton lot 22.50c, f.o.b. Niagara Falls, N. Y., freight not exceeding St. Louis rate allowed.

50% Ferrosilicon: Contract, carload, lump, bulk, 12.40c per lb of contained Si, carload packed 14.0c, ton lot 15.45c, less ton 17.1c. Delivered. Spot, add 0.45c.

Low-Aluminum 50% Ferrosilicon: (Al 0.40% max.) Add 1.3c to 50% ferrosilicon prices.

75% Ferrosilicon: Contract, carload, lump, bulk, 14.3c per lb of contained Si, carload packed 15.6c, ton lot 16.75c, less ton 18.0c. Delivered. Spot, add 0.8c.

80-90% Ferrosilicon: Contract, carload, lump, bulk 15.55c per lb of contained Si, carload packed 16.8c, ton lot 17.8c, less ton 18.95c. Delivered. Spot, add 0.25c.

Low-Aluminum 85% Ferrosilicon: (Al 0.50% max.) Add 0.7c to 85% ferrosilicon prices.

90-95% Ferrosilicon: Contract, carload, lump, bulk, 17.5c per lb of contained Si, carload packed 18.7c, ton lot 19.65c, less ton 20.7c. Delivered. Spot, add 0.25c.

Low-Aluminum 90-95% Ferrosilicon: (Al 0.50% max.) Add 0.7c to 90-95% ferrosilicon prices.

Silicon Metal: (Min. 97% Si and 1% max. Fe). C.l. lump, bulk, regular 20.0c per lb of Si, c.l. packed 21.2c, ton lot 22.1c, less ton 23.1c. Add 1.5c for max. 0.10% calcium grade. Deduct 0.4c for max. 2% Fe grade analyzing min. 96% Si. Spot, add 0.25c.

Alsifer: (Approx. 20% Al, 40% Si, 40% Fe.) Contract, basis f.o.b. Niagara Falls, N. Y., lump, carload, bulk, 9.90c per lb of alloy; ton lots packed 11.30c, 200 to 1999 lb 11.65c, smaller lots 12.15c.

Briquetted Alloys

Chromium Briquets: (Weighing approx. 3¾ lb each and containing exactly 2 lb of Cr). Contract, carload, bulk, 14.50c per lb of briquet, carload packed 15.2c, ton 16.0c, less ton 16.9c. Delivered. Add 0.25 for notching. Spot, add 0.25c.

Ferromanganese Briquets: (Weighing approx. 3 lb and containing exactly 2 lb of Mn). Contract, carload, bulk 10.95c per lb of briquet, c.l. packaged 11.75c, ton lot 12.55c, less ton 13.45c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Silicomanganese Briquets: (Weighing approx. 3½ lb and containing exactly 2 lb of Mn and approx. ½ lb of Si). Contract, c.l. bulk 11.15c, per lb of briquet, c.l. packed 11.95c, ton lot 12.75c, less ton 13.65c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Silicon Briquets: (Large size—weighing approx. 5 lb and containing exactly 2 lb of Si). Contract, carload, bulk 6.95c per lb of briquet, c.l. packed 7.75c, ton lot 8.55c, less ton 9.45c. Delivered. Spot, add 0.25c.

(Small size—weighing approx 2½ lb and containing exactly 1 lb of Si). Carload, bulk 7.1c, c.l. packed 7.9c, ton lot 8.7c, less ton 9.6c. Delivered. Add 0.25c for notching. small size only. Spot, add 0.25c.

Molybdic-Oxide Briquets: (Containing 2½ lb of Mo each) $1.14 per pound of Mo contained, f.o.b. Langeloth, Pa.

Calcium Alloys

Calcium-Manganese-Silicon: (Ca 16-20%, Mn 14-18% and Si 53-59%). Contract, carload, lump, bulk 20.0c per lb of alloy, carload packed 20.8c, ton lot 22.3c, less ton 23.3c. Delivered. Spot add 0.25c.

Calcium-Silicon: (Ca 30-33%, Si 60-65%, Fe 1.50-3%). Contract, carload, lump, bulk 19.0c per lb of alloy, carload packed 20.2c, ton lot 22.1c, less ton 23.6c. Delivered. Spot add 0.25c.

Titanium Alloys

Ferrotitanium, Low-Carbon: (Ti 20-25%, Al 3.5% max., Si 4% max., C 0.10% max.) Contract, ton lots 2" x D, $1.50 per lb of contained Ti; less ton $1.55. (Ti 38-44%, Al 5% max., Si 4% max., C 0.10% max.) Ton lot $1.35, less ton $1.37, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis. Spot add 5c.

Ferrotitanium, High-Carbon: (Ti 15-18%, Al 6-8%). Contract $177 per net ton, f.o.b. Niagara Falls, N. Y., freight allowed to destinations east of Mississippi river and north of Baltimore and St. Louis.

Ferrotitanium, Medium-Carbon: (Ti 17-23%, C 2-4.5%.) Contract, $195 per ton, f.o.b. Niagara Falls, N. Y., freight not exceeding St. Louis rate allowed.

Vanadium Alloys

Ferrovanadium: Open-hearth Grade (V 35-55%, Si 8-12% max., C 3-3.5% max.). Contract, any quantity, $3.10 per lb of contained V. Delivered. Spot, add 10c. **Crucible-Special Grades** (V 35-55%, Si 2-3.5% max., C 0.5-1% max.), $3.20. **Primos and High Speed Grades** (V 35-55%, Si 1.50% max., C 0.20% max.) $3.30.

Grainal: Vanadium Grainal No. 1, $1 per lb. No. 6, 68c; No. 79, 50c, freight allowed.

Vanadium Oxide: Contract, less carload lots $1.28 per lb contained V_2O_5, freight allowed. Spot, add 5c.

Zirconium Alloys

12-15% Zirconium Alloy: (Zr 12-15%, Si 30-43%, Fe 40-45%, C 0.20% max.). Contract c.l. lump, bulk 7.9c per lb of alloy, c.l. packed 7.75c, ton lot 8.5c, less ton 9.35c. Delivered. Spot, add 0.25c.

35-40% Zirconium Alloy: (Zr 35-40%, Si 47-52%, Fe 8-12%, C 0.50% max.). Contract carload, lump, packed 20.25c per lb of alloy, ton lot 21c, less ton 22.25c. Freight allowed. Spot, add 0.25c.

Boron Alloys

Ferroboron: (B 17.50% min., Si 1.50% max., Al 0.50% max., C 0.50% max.). Contract, 100 lb or more, 1" x D, $1.20 per lb of alloy. Less than 100 lb $1.30. Delivered spot add 5c. F.o.b. Washington, Pa., prices 100 lb and over are as follows: Grade A (16-14% B) 75c per pound; Grade B (14-18% B) $1.20; Grade C (19% min. B) $1.50.

Borosil: (3 to 4% B, 40 to 45% Si), $5.25 per lb contained B, delivered to destination.

Bortam: (B 1.5-1.9%). Ton lots, 45c per lb; smaller lots, 50c per lb.

Carbortam: (B 1 to 2%) contract, lump carloads 9.50c per lb, f.o.b. Suspension Bridge, N. Y., freight allowed same as high-carbon ferrotitanium.

Other Ferroalloys

Ferrocolumbium: (Cb 56-60%, Si 8% max., C 0.4% max.). Contract, ton lot, 2" x D, $4.90 per lb of contained Cb, less ton $4.95. Delivered. Spot, add 10c.

Ferrotantalum—Columbium: (Cb 40% approx., Ta 20% approx., and Cb and Ta 60% min., C 0.30 max.) ton lots, 2" x D, $3.75 per lb of contained Cb plus Ta, delivered; less ton lots $3.80.

Silcaz Alloy: (Si 35-40%, Ca 9-11%, Al 6-8%, Zr, 3-5%, Ti 9-11%, B 0.55-0.75%). Carload packed, 1" x D, 45c per lb of alloy, ton lot 47c, less ton 49c. Delivered.

SMZ Alloy: (Si 60-65%, Mn 5-7%, Zr 5-7%, Fe 20% approx.). Contract, carload, packed ¾" x 12 M, 17.5c per lb of alloy, ton lots 18.25c, less ton 19.5c. Delivered. Spot, add 0.25c.

Graphidox No. 4: (Si 48-52%, Ca 5-7%, Ti 9-11%). C.l. packed, 18c per lb of alloy; ton lots 19c; less ton lots 20.50c, f.o.b. Niagara Falls, N. Y.; freight allowed to St. Louis.

V-5 Foundry Alloy: (Cr 38-42%, Si 17-19%, Mn 8-11%). C.l. packed, 15c per lb of alloy; ton lots 16.50c, less ton lots 17.75c, f.o.b. Niagara Falls, N. Y.; freight allowed to St. Louis.

Simanal: (Approx. 20% each Si, Mn, Al; bal. Fe). Lump, carload, bulk 14.50c, packed 15.50c; ton lots, packed, 15.75c; less ton lots packed, 16.25c per lb of alloy, delivered to destination within United States.

Ferrophosphorus: (23-25% based on 24% P content with unitage of $3 for each 1% of P above or below the base); carloads, f.o.b. sellers' works, Mt. Pleasant, or Siglo, Tenn., $65 per gross ton.

Ferromolybdenum: (55-75%). Per lb. contained Mo, f.o.b. Langeloth, $1.32; Washington, Pa., furnace, any quantity $1.13.

Technical Molybdic-Oxide: Per lb. contained Mo, f.o.b. Langeloth $1.14, packed in bags containing 20 lb of molybdenum; Washington, Pa., 95.00c.

Metalworking Briefs . . .

CONSTRUCTION—ENTERPRISE—ORGANIZATIONAL CHANGES

Baldwin Builds Gun Mounts

An order for an undisclosed number of heavy motor gun carriage mounts has been received by Baldwin-Lima-Hamilton Corp., Eddystone, Pa. The order was placed by the Philadelphia Ordnance District office. These gun mounts will be among the largest of their type ever built. The corporation is engaged in the fabrication and machining of hulls for the General Patton tank. Orders for this type of materiel at the Eddystone plant total more than $60 million.

Sciaky Bros. Expands Plant

A $300,000 addition to its welding equipment plant in Bedford Park, Ill., will be built by Sciaky Bros. Co. Inc. of that city.

Bossert Leases Building

The Eureka Mower Co. building in Utica, N. Y., has been leased by the Bossert Co. Division of Timken Detroit Axle Co., Detroit. The Eureka property is adjacent to Bossert's Utica plant. Company officials have not revealed plans for the building, but it is possible that the firm is trying to consolidate its oil burner production in one building.

Jack Building New "House"

Bill Jack Scientific Instrument Co., Solano Beach, Calif., will construct a $1.2 million plant in Riverside, Calif. A founder of the World War II Jack & Heintz organization, Mr. Jack estimates his plant will produce at the rate of $5 million per month.

Pending completion of the plant, scheduled for July, temporary facilities have been purchased at Anza Village, Camp Anza in World War II. Company officials say the Anza Village plant will be in full production within four months. A new-type aerial camera developed at the Solano Beach plant, where 225 persons are employed in engineering and research, is expected to be put into production at the Riverside plant.

Sylvania To Build Iowa Plant

A new plant in Burlington, Iowa, is being planned by Sylvania Electric Products Inc., New York. Cost of the plant and equipment is estimated at $1.5 million.

Atlas May Merge with Hunt

Atlas Imperial Diesel Engine Co., Oakland, Calif., and Hunt Foods Inc., San Francisco, are studying the possibilities of a merger. Atlas sold its diesel engine building assets last July and has been concentrating on production of metal and glass containers, chiefly for Hunt.

Both companies are receptive to the merger; in fact, Atlas has retained an industrial engineering organization to study the possibility. The engineering firm is expected to recommend that Hunt acquire Atlas through an exchange of stock. To facilitate this possible action, Hunt Foods is considering a stock split of two and one half for one, the supposition being that following this split, the exchange basis for Atlas will be share for share.

Hough Doubles Capacity

A new plant and new products are being shown by Frank G. Hough Co., Libertyville, Ill. The building program has doubled Hough's production capacity. It includes a 30,000 square foot assembly building and a one-story office building having 18,500 square feet of floor space. The company's 1951 line of tractors, tractor shovels and other materials handling, construction and road building equipment are on display in the new plant.

Schultz To Leave Old Plant

E. W. Schultz & Sons Inc., Baltimore—general sheet metal work—plans to move later in the year from 1246 St. Matthews St. to 1700 Friendship St., that city. The company has been located at its present address for 70 years.

Micro Builds in Illinois

Micro Division, Minneapolis-Honeywell Regulator Co., Minneapolis, is building a $65,000 factory in Freeport, Ill.

Landay Opens Division

M. N. Landay Co., Pittsburgh, opened a steel products division for the handling of domestic and foreign steel mill products. The Pittsburgh office of the new division is in charge of Samuel Schadel, while the New York office at 30 Church St. is in charge of W. B. Frank. Landay is engaged in the scrap business.

Connors Lets Contracts

Connors Steel Co., Birmingham, a division of H. K. Porter Co. Inc., has set contracts for its $2 million plant expansion. Rust Engineering Co. was awarded the contract covering the engineering and installation of the additional electric furnace, an additional billet heating furnace and modernization of the present heating furnace. Also included are an 18-inch breakdown mill, new hot-bed and coiling facilities, and enlargement of the laboratory and metallurgical facilities.

Treadwell Engineering Co. will furnish the breakdown mill, manipulator and gear set. Pittsburgh

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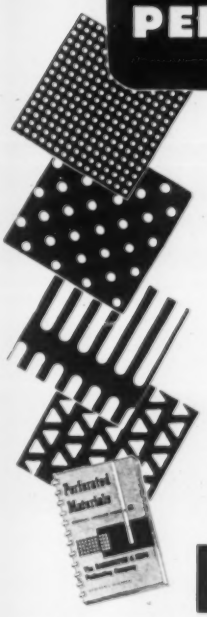

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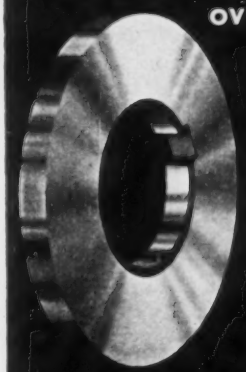

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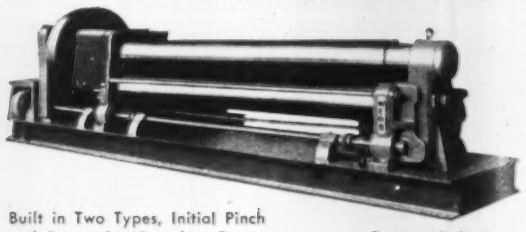

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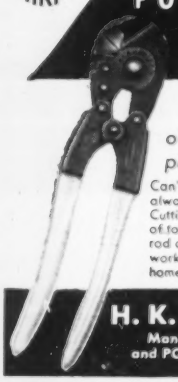

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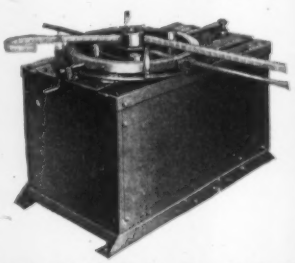

The Model D-2 Kardong Bender is a Four Direction Horizontal Bender. With this bender it is not necessary to turn bars over to make reverse or second bends on beam bars. The Model D-2 is made in two sizes, Model D-2 Standard 6-inch, which will bend bars around collars 2-inch to 6-inch, and Model D-2 Special 8-inch, which will bend bars around collars 2-inch to 8-inch. Capacity of both models, 1¼-inch Square Bars. The Model D-2 is a production bender for reinforcing steel fabricating shop. Ask for catalog of our complete line of reinforcing bar benders.

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Instamelt Furnace Corp. will build the 15-ton electric furnace. Elcon Engineering Co. Inc. designed the new reheating furnace and redesigned the old one. The 15-ton crane in the furnace building will be supplied by Whiting Corp.

When work is completed, Connors' capacity will be increased by 40 per cent.

Keystone Carbon Expands

Keystone Carbon Co., St. Marys, Pa., expanded its facilities for the manufacture of powder metal parts and negative temperature coefficient resistors.

Trico Products To Build

A $1 million building permit was issued in Buffalo to Trico Products Corp., that city, for erection of a manufacturing plant at 500 Elk St.

Helium Plant Reopens

Bureau of Mines, Washington, is reopening its helium plant at Otis, Kans., to meet increasing military and industrial requirements. The plant has a rated capacity of about 48 million cubic feet annually.

While the Korean campaign has been partially responsible for increased demands for helium, private consumption of helium has been growing steadily. Estimates for the current fiscal year indicate that about 95 million cubic feet will be needed compared with consumption of 63.3 million cubic feet in 1950.

Diversey Leases Building

Diversey Corp.—chemicals—Chicago, leased a building formerly occupied by Edgar T. Ward's Sons Co. at 400 Frelinghuysen Ave., Newark, N. J. The plant will provide Diversey's Eastern Division with sales office headquarters and manufacturing facilities. In addition to various chemicals, the company produces cleaners used in preparing metal surfaces for finishing.

Midway Tool Appoints Agent

Midway Tool Co. Inc., Melvin, O., appointed F. M. Warburton Associates, Hudson, O., as sales agents for its auger bits in northern Ohio and western Pennsylvania.

King Manufacture Moves

King Manufacture & Construction Co., Baltimore, maker of metal gates and posts, woven link wire, playground equipment, etc., moved from 1242 East Fayette St., into larger quarters at 1734 E. Fayette St., that city.

Budd Books War Orders

Budd Co., Philadelphia, has received defense contracts aggregating more than $110 million, calling for production of parts for tanks and jet engines, ammunition components, Army truck cabs, cargo bodies, wheels, hubs and drums, and a variety of other items. Production of some of these goods is under way at plants in Philadelphia, Detroit and in the new Chase plant in Gary, Ind. Additional contracts are in process of negotiation.

Mathieson Awards Contract

A $10 million plant at McIntosh, Ala., will be built by Mathieson Chemical Corp., Baltimore. It will produce chlorine and caustic soda, vital war materials now in short supply. Mathieson awarded the construction contract through its subsidiary, Mathieson Alabama Chemical Corp.

Island Equipment Celebrates

Island Equipment Corp., Bridge Plaza North, Long Island City, N. Y., observed its tenth anniversary last month. This manufacturer of conveyors and other materials handling equipment has had a rapid growth since its founding by John W. Stiles in 1941.

Atlas Mineral Names Agent

Atlas Mineral Products Co., Mertztown, Pa., appointed Shutt Process Equipment Co., St. Louis, as its agent for chemical resistant materials of construction in that territory. Prior to organization of his agency, George T. Shutt was in the purchasing department of Aluminum Ore Co., St. Louis.

Binks Opens New York Office

Binks Mfg. Co., Chicago, opened a new office in the New York area at 22-01 41st Ave., Long Island City, N. Y. The company makes spray guns, spray finishing equipment, cooling towers, and spray nozzles. Ed Cremer is the sales engineer and manager of the new office.

Hartford-Empire Renamed

Hartford-Empire Co., Hartford, Conn., changed its name to Emhart Mfg. Co. There is no change in the operation of the parent company's divisions: Henry & Wright, Hartford, which manufactures automatic presses; V & O Press Co., Hudson, N. Y., which produces punch presses, automatic feed attachments and special machinery.

Transfers Pittsburgh Office

Michigan Limestone & Chemical Co., a United States Steel subsidiary, transferred its Pittsburgh divisional offices to New Castle, Pa. Operating and engineering offices in New Castle were joined by the industrial relations, accounting, sales and legal departments which were moved from Pittsburgh. Michigan Limestone and Pittsburgh Limestone Corp. were merged in January into a single operating company with executive offices in Detroit.

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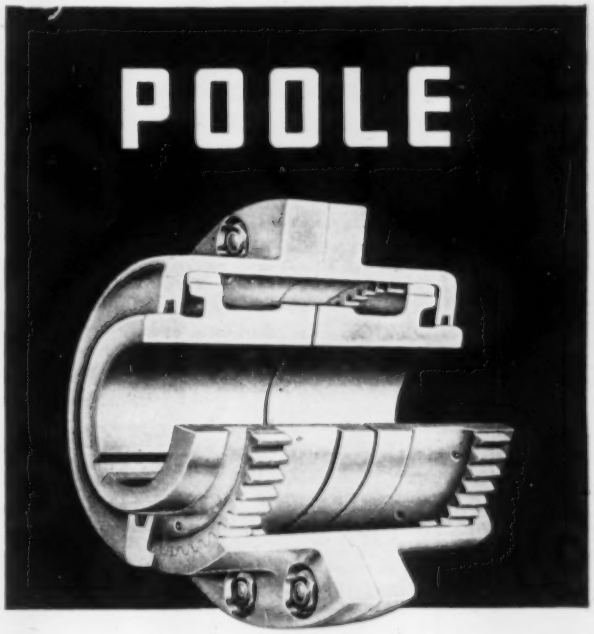

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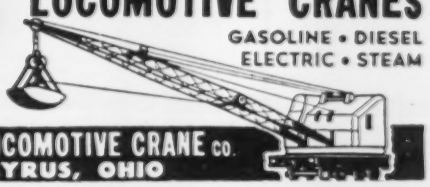

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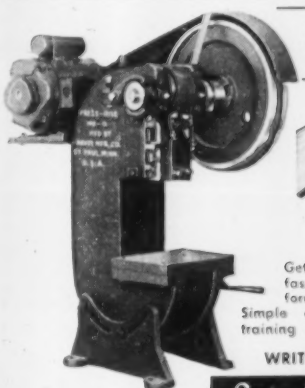

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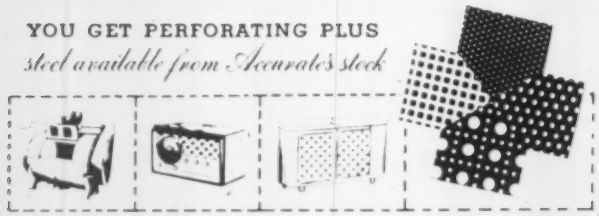

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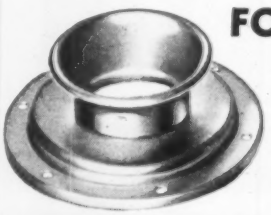

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New Castle division include a limestone quarry at Hillsville, Pa.; a dolomite quarry in Millville, W. Va., and underground limestone mines at Boyers, E. Brady, and Worthington, Pa.

Refractories Firm Expands

General Refractories Co., Philadelphia, is expanding its facilities to meet the rapidly expanding needs in the East. The company plans to build a $3 million plant for manufacture of silica refractories on the Delaware river at Morrisville, Pa. This is another phase of the company's $12 million expansion program.

Cleco Appoints Distributor

Cleco Division, Reed Roller Bit Co., Houston, appointed Gil Boers Equipment Co., Chicago, and Airline Equipment Co., Philadelphia, as distributors of its products in these areas. Cleco produces pneumatic tools.

Navy Orders Helicopters

Hiller Helicopters, Palo Alto, Calif., has converted its operations completely to military production. The company's order backlog totals $18 million, having been augmented by a new contract from the Department of Defense for evacuation type and Navy training helicopters.

Sharon Steel Honors Roemer

Sharon Steel Corp., Sharon, Pa., officially named the company's operating facilities at Farrell, Pa., the Roemer Works in honor of Henry A. Roemer, chief executive officer of the company and chairman of its board of directors. The action was taken to commemorate Mr. Roemer's 20 years of leadership of the company.

Under his guidance, Sharon Steel has grown to be a large strip steel producer. Productive capacity during the last 20 years has increased from 560,000 ingot tons per year to over 1.4 million tons, and coal and coke properties have been added to integrate the company.

Osborne Building Plant

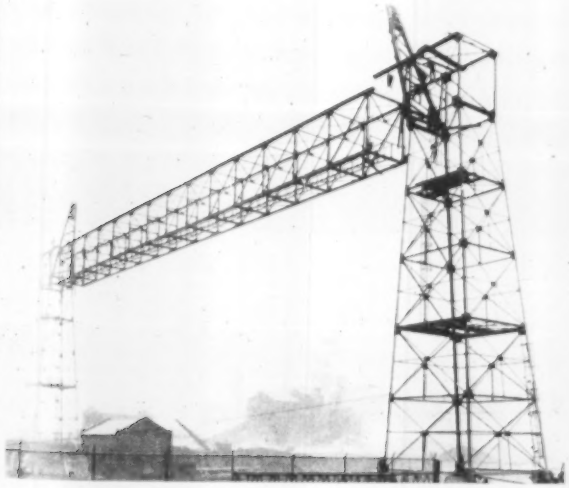
Osborne Machinery Co., San Francisco, is constructing a $350,000 plant in San Leandro, Calif., to be known as the Malabar Mfg. Co., a division of Osborne. Recently purchased from Menasco Mfg. Co., the Malabar plant will be devoted to manufacture of hydraulic jacks for the aircraft industry.

Magnesium Agent Retained

Whittaker, Clark & Daniels Inc., New York, will continue to distribute marine magnesium products—magnesium carbonate, magnesium oxide and magnesium hydroxide—under the trademark names of Maglite and Hydro-Magma for the new Marine Magnesium Products Division, Merck & Co. Inc., Rahway, N. J.

Cannon Electric Goes East

Cannon Electric Co., Los Angeles, will establish an electric connector assembly plant and warehouse in New Haven, Conn. Cannon licensed Aeronautical Supply Co., Melbourne, Victoria, to build its electric connectors in Australia.



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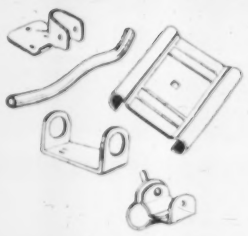

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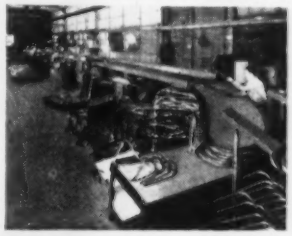

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